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DE EXPERIENTIA DOCTRINA.

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ARTICLE I.

Chemistry of the Metals—Silver and its Compounds. By Professor R. N. Wright, M. D.

(Continued from page 565.)

Salts of Silver.—We propose as the conclusion of the article which appeared in the last number of the Journal, to describe the remaining compounds and combinations of silver, and the method of electro-plating as practiced by Mr. Smee, together with the process of assaying.

The first combinations to be described are those formed between silver in the shape of oxyd, and acids; and, the first we will examine is that compound formed by a union of carbonic acid and oxyd of silver known as

Carbonate of Silver.—The readiest method for the formation of this substance is, to add to a solution of *nitrate of silver* in distilled water, a small quantity of carbonate of potash also in solution, there is a rapid interchange of elements—the nitric acid of the silver, taking up with the potash and the carbonic acid of the potash uniting with the oxyd of silver. The new

substance, when first formed in this manner, appears as a white flocculent precipitate, but speedily blackens on exposure to light.

Sulphate of Silver.—This salt is formed abundantly, whenever we mix a soluble alkaline sulphate (as (e. g.) sulphate of soda) in solution, with a solution of nitrate of silver, or it may be made by pouring sulphuric acid upon silver, and then applying heat. The precipitate has a white color and saline taste, and is capable of crystallization—the crystals being prismatic and containing little or no water, indeed, when properly prepared they are quite auhydrous, requiring about 91 times their weight of water, at 60° F. for perfect solution. Water at 212° F. possesses a much greater solvent power; there is, however, little advantage in using it, since all the excess is deposited when the solution again reaches 60° F.

It is asserted that "upon a large scale, small portions of gold may be most economically separated from large quantities of silver, by heating the finely granulated alloy in sulphuric acid; the gold remains in the form of a black powder, and the sulphate of silver may be decomposed by the action of metallic copper; the silver is precipitated in a pulverulent state, and, with a little borax or other vitrifiable flux, is fuzed, and cut into ingots; the sulphate of copper is easily obtained in the crystallized state, by evaporating the residuary liquid." "A compound acid, which may be called *nitro-sulphuric*, consisting of 1 part of nitre dissolved in about 10 of sulphuric acid, dissolves silver at a temperature below 200°, and the solution admits of moderate dilution before sulphate of silver separates from it. This acid, scarcely acts upon *copper*, *lead* or *iron*, unless diluted with water; it is, therefore, useful in separating the silver from old plated articles; the precious metal, may afterward be separated, either in the form of chloride, by adding common salt, or by diluting the acid, and continuing the immersion of the pieces of copper which have lost their silvering, and which will now dissolve in the diluted acid, and occasion the precipitation of metallic silver."

Sulphate of silver, will be decomposed by a heat a little below absolute redness, and metallic silver remains. The best form

of crystallization is obtained by adding diluted sulphuric acid to its solution.

Hyposulphate of Silver.—The best process for the formation of this salt is that recommended by Heeren; viz. to digest carbonate of silver, (formed by the process we have described, or any other more convenient,) in hyposulphuric acid, a permanent crystalline mass is the result, which is quite soluble, requiring only about two parts of water for its solution. The *ammonio-hyposulphate* of silver will be formed, when ammonia in considerable quantity is added to the solution, the result being a mass of minute, granular crystals.

Sulphite of Silver.—By digesting oxyd of silver in sulphurous acid, we produce a granular mass, which is sulphite of silver; and it may also be obtained through the agency of double decomposition, by adding a soluble sulphite of an alkali, to a soluble salt of silver, as the nitrate.

Hyposulphite of Silver.—The following description of this salt may be found in Brande, p. 962. He says, "it has been examined by Hershell, and is formed by dropping a weak solution of nitrate of silver into a very dilute solution of *hyposulphite* of *soda:* a white cloud is at first produced, which redissolves on agitation; on adding more of the precipitant, the cloud reappears, and aggregates into a gray precipitate, which appears to consist of *hyposulphite of silver;* the supernatant liquor tastes intensely sweet, which is remarkable, considering the disgusting bitterness both of the nitrate and of the hyposulphite, and shows 'how little we know of the way which bodies affect the organs of taste. Sweetness and bitterness, like acidity, seem to depend upon no particular principle, but seem to be regulated by the state of combination in which the same principles exist at different times.' *Hyposulphite of silver* is also produced, when chloride of silver is dissolved in any of the hyposulphites, the solution is intensely sweet without any metallic flavor. These facts show the strong affinity that exists between *oxyd of silver* and *hyposulphurous acid.* The solubility of argentine compounds, in hyposulphite, has led to an important application of them in photogenic drawing, for the

1*

purpose of fixing the designs, by the removal of all adhering or unchanged salt of silver. *Hyposulphite of silver* is very prone to decomposition, so as to form sulphate of oxyd of silver, and sulphuret of silver; hence the occasional blackening of its solutions."

Nitrate of Silver.—When silver is exposed to the action of *nitric acid*, diluted with about three parts of water, there is a rapid disengagement of *nitric oxyd gas*, and a corresponding diminution in the bulk of the silver, because the acid is dissolving it, and the characteristics of the result will depend much upon the purity of the acid used in the experiment; there will be a cloudy solution and white precipitate; if *muriatic acid* be present, the presence of gold will give a dark colored powder of undissolved metal, and if copper is present, we shall have a solution of a bluish-green color.

When we have obtained a solution of nitrate of silver, free from the above and other impurities, it is perfectly transparent and exceeding caustic, (if the solution be a saturated one.) From a property which it possesses, of changing all organic textures with which it comes in contact, to a purplish black color, which is permanent, it is extensively used as the basis of indelible inks. As we procure it in the shops, in small circular sticks, it is far from being pure, and only semi-crystalline; but it may be beautifully crystallized into plates, and when thus dissolved in distilled water, its properties can be well displayed. This salt is very soluble in water, demanding only about an equal weight at 60° F., and whenever the solution is required for accurate experiments, the water should be carefully distilled. When well prepared, the salt exhibits no acid properties with the ordinary tests, but is strictly neutral, and the solution should be kept in well stopped vials, of a dark color, and in a place to which light cannot gain access, otherwise, by exposure, it becomes speedily blackened.

Brande says, "when nitrate of silver has been thus acted upon by light, it is no longer perfectly soluble in water, owing to the separation of a portion of metallic silver." The best method of prepairing the common "lunar caustic" of the shops, is to expose the nitrate to the action of heat in silver crucibles,

it then becomes a crystalline mass, having a grayish-white color, and is commonly sold in cylindrical sticks. There is some care necessary in its production, such as keeping the moulds well warmed, but not too hot, a high temperature being apt to blacken it, and if the temperature be carried to redness, the salt will be decomposed with the reduction of metallic silver.

"Sulphur, phosphorus, charcoal, hydrogen and several of the metals decompose this nitrate. A few grains mixed with a little sulphur, and struck with a heavy hammer upon an anvil, will give a detonation; phosphorus occasions violent explosion when about half a grain of it is placed upon a crystal of the nitrate, upon an anvil, and struck sharply with a hammer; and if heated with charcoal it deflagrates, and the metal is reduced."

The immersion of many substances into a solution of nitrate of silver, will occasion decomposition, with the revival and deposition of the metal. A clean stick of phosphorus, thus immersed, will speedily become covered with a beautiful arborescent incrustation. Deposition also rapidly takes place upon slips of clean metal, as copper, &c.

"*Mercury introduced into the solution of nitrate of silver, causes a beautiful crystalline deposit of silver, called the *arbor Dianæ;* as remarked by Lemery. To obtain this crystallization in its most perfect state, the solution should contain a little mercury, and the mercury put into it should contain a little silver. Baumé directs an amalgam of one part of silver with seven of mercury, of which, a small piece is to be introduced into a solution composed of 6 drachms of saturated nitrate of silver, and 4 drachms of a similar solution of mercury, diluted with 5 ounces of distilled water: a small flask or matrass should be used for the experiment, kept perfectly at rest; in a few minutes small filaments of silver darken the surface of the amalgam, and in about eight and forty hours, the whole has separated in a shrub-like form. The addition of mercury to the solution, and of silver to the precipitating mercury, is said to give a degree of tenacity to the arborescent deposit of crystals, which prevents their falling to the bottom of the flask."

*Brande, p. 960.

Ammonia added to a solution of nitrate of silver occasions a yellowish-white precipitate, which is soluble in excess of the precipitant; and we thus produce a valuable auxiliary fluid-test for the presence of *arsenic*, known as the *ammonio-nitrate of silver* test. In preparing it, the ammonia, should be added, drop by drop, until the precipitate is on the eve of being dissolved, when it is ready for use.

Nitrate of silver is decomposed with precipitation by many of the strong acids, by many of the metallic salts, and also by most of the alkaline oxyds. We have already remarked, that this salt forms the basis of most of the indelible inks; the following is, perhaps, as good a recipe as can be used: "Dissolve* 2 drachms of nitrate of silver, and 1 drachm of gum arabic, in 7 drachms of distilled water, colored with a little China ink. The preparatory liquid for moistening the cloth, is made by dissolving 2 ounces of crystallized carbonate of soda and 2 drachms of gum arabic in 4 ounces of water. Nitrate of silver is an ingredient in some of the hair dies, is an escharotic in surgery, and is administered internally in medicine, with this bad effect, however, that if exhibited for any length of time, it imparts, by absorption into, and discoloration of, the *rete mucosum*, an olive brown tint to the whole surface of the body, which is permanent and unchangeable."

Grahame says, that on account of the expense of the preparation for writing on linen, which we have described, bleachers have substituted a solution of coal tar in naptha, made sufficiently thin for the pen, and which will effectually resist the action of chlorine.

As a test for the presence of chlorine, whether free or combined, nitrate of silver is one of the best we possess; producing immediately a dense flocculent precipitate, which subsides, white at first, but speedily changing color; passing through various shades of purple to a dark color; becoming almost black on exposure to light.

There are other substances which will produce similar pre-

*Brande, p. 960.

cipitates with nitrate of silver, but we will generally have little trouble in ascertaining their nature. Hydrobromic, hydriodic and hydrocyanic acids are mentioned, as belonging to the list of those substances which produce white precipitates with nitrate of silver, blackening on exposure to light.

Nitrite of Silver.—The following is Proust's method of obtaining this substance: Saturate good nitric acid with silver, and then boil in it silver reduced to fine powder; or *nitrate of soda* may be fused until it becomes nitrite, and in this condition, may be added to a clear solution of a silver salt, the combination resulting in the production of a brown precipitate; which is to be dissolved in water at a temperature of 212° F., precipitated by nitrate of silver, and filtered at a high temperature; the cooling of the solution separating nitrite of silver, a very sparingly soluble salt, requiring at 60° F. more than 100 times its weight of water for solution.

Chlorate of Silver is produced whenever oxyd of silver is digested in chloric acid, and appears in the shape of rhombic crystals sparingly soluble in water.

Iodate of Silver is the result of the admixture of a solution of a soluble salt of silver, and iodic acid or a solution of a soluble alkaline iodate, a white precipitate falling, which is decomposed on the addition of *sulphurous acid*, with the production of *sulphuric acid* and *iodide of silver*.

Cyanate of Silver.—According to Liebig, when cyanate of potash is dropped into a solution of nitrate of silver, a white precipitate, soluble in water at 212° F. is thrown down, which will burn with deflagration, blacken with a high temperature, and result in *cyanic acid*, *carbonic acid*, *nitrogen* and *dicyanuret of silver;* it is supposed to be a true cyanate of silver.

Borate of Silver is formed readily by adding a solution of boracic acid to a solution of nitrate of silver, and the result is but sparingly soluble in water.

Phosphate of Silver is produced whenever we add a solution of some alkaline phosphate, (as phosphate of soda,) to a solution of nitrate of silver. It has a yellowish color, and blackens on exposure to light.

Pyrophosphate of Silver is formed by a process analogous to the last described, only substituting *pyrophosphate of soda* for the phosphate; its color, however, is different, being white instead of yellow.

Chromate of Silver is produced whenever we add a solution of an alkaline chromate, as chromate potash or soda, to a solution of nitrate of silver; its color being at first deep red, changing to a dark brown on exposure to light.

Arsenite of Silver is the result of a union of *arsenious acid* and nitrate of silver, both in solution, and the *arseniate of silver* can be formed in the same manner by substituting *arsenic acid* for *arsenious.*

Fulminate of Silver.—For the subjoined description of this substance, see Brande, page 965. "This curious and dangerous compound, is prepared as follows: 100 grains of fused and finely powdered nitrate of silver, are added to an ounce of warm alcohol, and the mixture stirred in a sufficiently large glass basin; an ounce of *fuming nitric acid* is then added, and presently a violent effervescence ensues, and a powder falls; as soon as this appears white, cold water is added, and the powder is immediately to be collected upon a filter, washed and carefully dried at a temperature of 100° F. In collecting and handling this powder, the utmost caution is requisite; it should be made in small quantities only, and touched with nothing hard, for it has sometimes exploded upon the contact of a glass rod, even under water: the feather of a common quill serves to collect it; and it should be kept in a wide-mouthed vessel, covered by paper, and by no means in a stoppered, or even in a corked, vial, as serious accidents have arisen from its unexpected explosion. In short, one cannot be too careful in meddling with it, and its use for fulminating balls, and other purposes of amusement is highly dangerous. Berzelius observes, that, in preparing fulminating silver, a vessel of sufficient capacity should be used to prevent the liquid running over during effervescence, by which portions of the powder are deposited upon its exterior, and apt to explode when dry; that all approach of flame should be avoided, during the escape of *nitrous etherized gas*, because its inflammation would probably occasion the powder to

explode; and that care should be taken, to avoid introducing all hard substances, to stir or touch the precipitate."

He describes Liebig's process as follows: "A drachm of refined silver, is dissolved in half an ounce of nitric acid, specific gravity, 1.36 to 1.38; two ounces of alcohol, specific gravity, 0.85, are then added, and the whole heated in a matrass; white flocculi soon appears, and when ebullition begins, the heat is to be withdrawn; the effervescence, however, continues, and the powder falls; when action ceases, the powder is to be collected with the precautions above described."

Fulminating silver is mentioned as "a gray crystalline powder; acquiring a dingy hue by exposure to light, dissolving in about 40 times its weight of water at 212° F., and depositing minute crystals, as the solution cools. From one-half a grain to a grain will detonate violently, either by means of heat, friction, percussion, sulphuric acid, galvanism or electricity."

We have now collected and arranged a brief summary of all the important compounds of silver, rather with the view of making the article systematically complete, than with any other object; and, we will now proceed to a conclusion, with the description of the process of *electro-plating*, the method of assaying silver, and, the characteristics of its salts.

Galvano-Plating.—"The method of *silvering* or *plating* by the galvanic current," says Mr. Smee, "is difficult, but the general plan of action very nearly resembles that pointed out in the article on *galvano-gilding*. The surface of the object we desire to coat, must be cleaned by a solution of potassa, and then rubbed over with whiting; after which, it is ready for insertion in the fluid. The galvanic arrangements are similar to those for gilding, with the exception, that instead of a platinum wire, a silver wire should be used as the oxygen pole or anode, or in other words, that in connection with the silver of the battery. The object to be plated, (as in the case of gold, already described,) must not remain a single instant in the solution, whilst the circuit is incomplete. All further arrangements are similar to those described for gold.

The solution used must either be a weak *sulphate*, *acetate* or

hyposulphite of silver, with a little *dilute sulphuric acid.* After the metal has been in the solution for two or three minutes, it will assume a dark color, when it is to be removed, and rubbed over with whiting, and this process repeated till a sufficient thickness of metal is obtained. The regulation of the quantity of *electricity* is important, and is best effected by using the finest possible piece of silver wire as the positive pole."

"In the description given for coating other metals with a thin layer or film of any of the noble metals, a weak solution has been recommended, as less likely to favor local action; but if we are desirous of coating any metal, where no elective affinity can take place, the metallic solution may be used of any strength."

Assay of Silver.—The following description of this process is copied, verbatim, from Brande, page 970. "The analysis of alloyed silver, is a very important process, and in continual practice by refiners and assayers. It may be performed in the humid way by dissolving the alloy in *nitric acid*, precipitating with *hydrochloric acid*, or *chloride of sodium*, and either reducing the chloride by potassa, or estimating the quantity of silver it contains. The usual method, however, which is employed at the mint, and by the refiners, is cupellation. Of the useful metals, there are three capable of resisting the action of the air, at high temperatures; these are silver, gold and platinum; the others, under the same circumstances, become oxydized; it might, therefore, be supposed, that an alloy containing one or more of the first three metals, would suffer decomposition, by mere exposure to heat and air, and that the oxydizable metal, would burn into oyxd. This, however, is not the case; for if the proportion of the latter be small, it is protected, as it were, by the former; or, in other cases, a film of infusible oxyd, coats the fused globule, and prevents the further action of the air. These difficulties are overcome by adding to the alloy some highly oxydizable metal, the oxyd of which is fusible. Lead is the metal usually selected for this purpose, though bismuth, will also answer. Supposing, therefore, that an alloy of silver and copper is to be assayed, or analyzed by cupellation; the

following is the mode of proceeding: a clean piece of the metal, weighing about 20 grains, is laminated and accurately weighed in a very sensible balance. It is then wrapped up in the requisite quantity of sheet lead, (perfectly pure and reduced from *litharge;*) apportioned by weight to the quality of the alloy under examination, and placed upon a small cupel or shallow crucible, made of bone earth, which has been previously heated. The whole is then placed within the muffle, heated to bright redness: the metals melt, and, by the action of the air which plays over the hot surface, the lead and copper are oxydized and absorbed by the cupel, and, if the operation has been skillfully conducted, a button of pure silver ultimately remains; the completion of the process being judged of by the cessation of the oxydation, and motion upon the surface of the globule, and by the very brilliant appearance assumed by the silver when the oxydation of the alloy ceases. The button of pure metal is then suffered to cool gradually; and its loss of weight will be equivalent to the weight of the alloy, which has been separated by oxydation, a certain allowance being made for a small loss of silver, which always occurs, partly by evaporation and partly carried off by the oxyds which are absorbed by the cupel. To perform this process with accuracy, certain precautions are requisite, which can only be learned by practice, so as to enable the operator to gain uniform results."

Characters of the Salts of Silver.—The author we have just quoted, in describing the characters of the salts of silver, says, "the soluble of salts of silver are recognized by furnishing a white precipitate with hydrochloric acid, and the soluble chlorides, which blackens by exposure to light, and which is readily soluble in ammonia; and by affording metallic silver, on the immersion of a plate of copper. The salts, insoluble in water, are mostly soluble in liquid ammonia; when heated on charcoal, before the blowpipe, they afford a globule of silver. All the salts of silver, excepting those which contain colored acids, are colorless, provided, they have not been exposed to light, or deoxydizing agents, of the influence of which, they are extremely susceptible. A *yellow precipitate* on the addition of phosphate

of soda, and of the soluble *arsenites*, a *red brown* by *arseniates*, a *crimson* by chromates, and *white* by *fenocyanuret of potassium*, are further characteristics of the soluble salts of silver." "*Tin* and *lead*, are the most rapid *precipitants* of metallic silver from the nitrate; *cadmium*, *zinc*, *copper*, *bismuth* and *antimony*, are more slow in their operation, and *arsenic* and *mercury* still more tardy. In all cases, the silver appears crystallized; often, blackish at first, but afterwards assuming the metallic lustre. *Iron* is a speedy reducer of the *sulphate of silver*. The insoluble salts of silver mixed with water, are also similarly decomposed, but the operation is more slow. *Chromate of silver*, probably, on account of its insolubility, is extremely slowly reduced; *cadmium* is the most effectual metal for the purpose. *Chloride of silver* is rapidly reduced, by most of the metals which form *soluble chlorides*, such as *zinc*, *iron*, *cadmium*, *cobalt* and *arsenic; lead*, *nickle*, *copper*, *antimony* and *mercury*, act slowly; and *tin* and *bismuth*, are very feeble in their action. *Zinc*, *copper* and *arsenic*, rapidly deduce the ammoniacal solution of oxyd of silver. Of all the *metallic* precipitants, *zinc* and *cadmium* are the most effective; but, when *zinc* or *antimony* are used, the separated *silver* contains those metals."

The subject of the next article will be platinum.

[To be continued.]

ARTICLE II.

Patents and Patentees. By J. W. KEYES, M. D., D. D. S., of Quincy, Fla.

IN the April number of the American Journal of Dental Science, we find an article by Dr. Hill, in which he proposes to "clear away the rubbish and extraneous matter which has accumulated about the subject of patents, and prove that a man has

a legal, moral and professional right" to patent his inventions and improvements.

It appears to us, that in the following remarks, he has admitted all for which the advocates of the opposing side contend. He says, "when an individual is admitted to fellowship in any society having a constitution or by-laws, or both, it is expected of him that he will conform both to their letter and spirit. If one of these articles forbid the procurement of a patent, and he becomes a patentee, it is clear that he has violated the principles of fellowship in such society. His offence is a conventional one, and under certain circumstances may be characterized as an immorality.

"But if there is no article in the constitution or by-laws, or vote, or resolution passed by the society, which prohibits the right of any member to secure letters patent, has he then violated the terms of the compact? We think not.

"We will go farther and say, that if it can be shown that immemorial custom and usage in the society of which he is a member, has reprobated the principle of patents, he has committed an offence for which due atonement should be made. Can this be said of our profession, or any society of practitioners connected with it? If so we stand convicted, if not we are clear. With respect to the medical profession proper, we are aware of a strong feeling against the principle of patents in the profession, and we have been taught to regard it as *dishonorable* in a medical practitioner to become a patentee in things pertaining to practice, although the catalogue of M. D's guilty of this offence is really formidable."

Although there may be nothing in the constitution or by-laws, no resolution or vote of the American Association of Dental Surgeons against the principle of patenting in the profession, is not, we would ask, the *feeling* of the association against it? Does not our oldest and most distinguished schools disapprove of it? Is it not, at least, a doubtful propriety? Is not a large majority of the profession opposed to it? and does not this majority embrace a large proportion of those who have done *most* to elevate the profession to its present respectability and usefulness?

Has not immemorial custom and usage in the medical profession reprobated the principles of patents, and does not the *feeling* at the present day set *strongly* against it? Are there any among the fathers of medicine in this country, any of science's most distinguished sons, any of those who have done most to develop the resources of the profession, who do not reprobate this principle as improper and as tending to degrade the science of medicine? Do they not refuse to consult with the patentee? Is he, in any respect, admitted to terms of *equality?* Is not the hand of fellowship withheld, and is he not treated as an *outlaw?* Whence is the profession of dentistry? What its parentage? Is it not to all intents and purposes a part of medicine, a branch, a specialty merely? Can you mark out strictly where the trunk ceases or the branch begins? If then it is wrong in a physician to patent pills or practice, it must of consequence also be for the dentist.

Every profession has its infancy, its childhood, and its manhood. When in the infancy of dentistry, the practice was confined to barbers and those of like class, into whose hearts the idea of improvement, unconnected with profit, never entered, a species of patenting might have been expected, it was the natural result of the motive to improvement. Here the professional trade, would have rested, remaining in infancy. But men who looked beyond *this* and coupled with gain the general good, saw the necessities of society, and actuated by a desire to do good as well as get gold, adopted this as their vocation, *then* the infant began to grow, felt the genial influence and speedily expanded into maturing usefulness. Just in proportion as *this* class of men came into the profession, did its standard become elevated, its usefulness enhanced. And just here is the pivot upon which turns a feeling. It is this desire to do good, which acts as leaven to the loaf, which makes the difference between the profession and the trade. Will the encouragement of patenting elevate the profession in respectability or usefulness? Will it induce men of merit, of means, of education and talents to adopt it as their pursuit? On the contrary will not its encouragement tend rather to lessen its respectability? Suppose

it was considered proper for a physician to patent pills and practice, how long before the profession would cease to exist as a calling, high and responsible? How long before the conscientious, honest, highminded, educated, would cease to enter it? How long before it would be a disgrace to be a *doctor* and ignorant patent-physic pretenders doling out their damning doses made up the mass of those dignified with the title? How long before it would be regarded with the same contempt, held in the same estimate which dentistry was a few years ago, when dentist and villanous vagrant were synonymous?

It is asked why not put the services of the physician and dentist upon the same footing as the clergy, viz. the voluntary contributions of the people, and thus make them free to the poor and abject portions of the community? We answer that there is where it should be, where, if the medical profession were properly purged and the people enlightened it would be, and where we hope at some day not far in the future it will be. Are not the services of the physician, and to some extent the dentist also, now free to the poor and abject? Does not the physician daily do charity, and the dentist too, to a less extent? The services of the dentist are not so much required as those of the physician, for the necessities of the poor and abject are not the same as those of people higher in life. The loss of a tooth to a man in one station of life is a *very* serious matter, whilst to another moving in a different sphere, it is a trifle. Has a dentist ever been known to turn away an applicant to have his tooth extracted because the applicant was unable to pay for the operation? Does the surgeon refuse to operate because the patient is poor, if the operation is necessary to relieve suffering or save life? We answer no, so far as we have ever known, emphatically no. Is this the case with the patentee? Take as an illustration Dr. Banning, "he has spent much time and money in perfecting a—contemptible—body brace." During this same period "Dr. Nameless" has spent much time and money in acquiring skill in surgery. Here then, without a patent they are upon an equal footing. Dr. B. receives high fees for body bracing, Dr. N. nothing for his opera-

tions. Dr. B. takes out a patent, and unless you brace his pocket, he will not brace your body, whilst Dr. N. will amputate your legs without charge, and dismiss you with his blessing and a part of his purse.

But "suppose the talents of some member of the dental profession should lead him into a series of experiments, which eventuates in the discovery of a process by which his professional brethren can be greatly advantaged and immense good to mankind result from it, meantime, in perfecting and bringing his discovery before the world his means are all exhausted, his family destitute and he greatly embarrassed with debt, and that debt incurred in prosecuting his experiments. How is he to be indemnified?"

Suppose after he has received high encomiums, gold medals, etc., his improvement is *worthless*—how is he to be indemnified? Suppose he patented it, sold privileges and rights, and it is of little or no value, what is to be done with him? Suppose he beggared his family in pursuit of some *great invention* and did not make it, how is he to be indemnified? Clearly, a man has no right to risk the well-being, the subsistence of his family upon the cast of a die. But this man has made an invention "of great advantage to his professional brethren and of immense good to mankind." Then let him rest for his reward upon the high position which it gives, the increased patronage which it brings. Let congress vote him a sum proportioned to the benefits his discovery brings mankind. Let academies reward him, and colleges vote him honors—and *solid* honors when they can. Let him not take out a patent—for though there exists no legislative enactments against it, a man may not do all the law allows.

It is said that "in all the high sounding verbiage, selfishness, like a serpent, lies concealed and demands the time, labor and money of the inventor without compensation." We ask what you have received? Nothing? Have you contributed so much that you must have *extra* pay? Are the various, valuable improvements and discoveries daily spread upon the pages of our journals of no value to you? Cost they, their authors, nothing?

Is the accumulated knowledge of all those who have gone before and cotemporary with you of no value? Every one contributes according to his means, and if you, by virtue of superior talents, are able to contribute much, it is, at least, no more than the widow's mite. We enter the brotherhood with the tacit understanding that we will do what we can to advance and improve it, and it behooves us to do whatever our hands may find to do. "Men's genius and talents are various and sure in different channels; on what principle is the labor of one man to be appropriated to the use of the public without reward and another extravagantly paid for his services?" Aye—abstractly—upon what principle? How is it that there is a difference between men? Upon what principle is it that this man toils, even unto death, and leaves his labors to bless the world, whilst another, who never advanced an idea, never relieved a want, rolls in affluence through a long life? Upon what principle is it that one man labors hard all day and receives one dollar, whilst another with little labor receives ten? Upon what principle is it that you, by the utmost tension of mental and physical powers for twelve months can earn only three or five thousand dollars, whilst Webster in a day, aye or a simple yea or nay, or even a nod of his great head, should receive ten thousand? Here are men of the same profession, who have labored harder than Webster ever did, and yet they barely subsist.

A parallel has been attempted between the author and the dentist, but, to our minds, there is an essential difference. The author rests for his remuneration upon securing his copyright, just as the dentist does upon his fees. If he invents a new kind of *verse*, for instance, he does not patent it, but relies upon the "*glory*" and the increased patronage for his remuneration. He has no other fee than such as his books bring. This then is his profession, and in securing his patent right he does not go out of it. If your profession is to *invent*, secure your inventions by patent, but if it is to practice dentistry or medicine, cling to *it*—do not *alloy* it.

But we must close these desultory remarks—We are pained that any thing in our former article should have wounded Dr.

Hill, for his talents and attainments merit our admiration, and he has it. He was specified, because he stood so prominently; not because there was anything *venomous* in our feelings towards him, for we look longingly forward to the day when his "*early teachings*" will have its legitimate effect, and bring him, and all others, to "eschew the patent as they would dishonesty." We may not have succeeded in making this matter *plainer* to others, but to our own mind, it is clear that patents are morally and professionally wrong, because, they tend to degrade the profession, and as a consequence lessen its usefulness, and open a wide field for the exercise of quackery and dishonesty.

May 10*th*, 1853.

ARTICLE III.

On Filling Teeth when Complicated with Inflammation of the Pulp. By C. SPENCE BATE, Esq., Plymouth, England.

THE numerous papers of interest which have appeared in the late numbers of the Journal of Dental Science under the head of "Filling over exposed lining membrane," &c., have induced me to send one or two cases which interested me much at the time. The *modus operandi*, I may also say, differs in some of its details from those given, and is, as far as I am aware, peculiar to myself.

The dentists in England unfortunately are exceedingly detached as individuals from each other. This, no doubt, originates from the want of some professional test, whereby we may distinguish the educated man from the less cultivated; but out of evil often proceeds good. Each member is thrown upon his own resources, in order to arrive at a successful treatment, and I have little doubt but that many in England, if they could be induced to publish their plans of treatment, would be able to exchange wrinkles of some value.

Jan'y 30.—Miss S., of London, came on a visit to her relations in Swansea, (where I resided and practiced for twelve years,) for her health, her constitution generally being debilitated. She called upon me relative to two central incisor teeth of the upper jaw, both of which were decayed, the right tooth loose, the gum inflamed and swollen, and an abscess developed beneath the lip. The whole had been for many days and still continued acutely painful. Upon my commencing to prepare the cavity for plugging, she expressed her doubt of its utility, because three times within two years had they been already done in the metropolis, but with no beneficial result. The filling soon became loose, and after a time came out, leaving the hole larger than before. She, therefore, would have preferred the entire removal of the tooth and an artificial substitute.

However, I proceeded with the operation, removed much of the decay but did not expose the pulp, though the decayed portion reached the central cavity of the tooth. I ordered a leech to the gum, an aperient and rest, and dismissed her after having filled the tooth with *gutta percha stopping*.

What I call *gutta percha stopping* is a mixture I make myself, of plaster of paris and gutta percha, mixed before the fire until the latter will take no more without crumbling. This I find a useful temporary stopping, and after it has been in the mouth a few minutes presents no excessive contrast with the tooth.

February 10.—On this day my patient again visited me. I found the tooth firmer, with less swelling. The leech had been misapplied and took only on the lip; the tumor got worse, and a second leech was more successful, removing the pain and bringing down the swelling. I opened the abscess on the gum, filled permanently the left incisor, which was not complicated in the inflammatory action which had attacked the right.

March 5.—Found the tooth firm and free from pain, abscess gone, a slight redness with scarcely perceptible swelling remained in its place, but which my patient informed me had not been so much the day before as now. The temporary stopping was not well in. She had suffered no pain since I last saw her,

but the tooth had lost its color, looking a little gray, the pulp was dead and some dark tissue remained, which was removed by boring into the pulp cavity, then plugged the tooth, adopting a plan recommended in one of the American journals, of putting in a piece of white paper to prevent the gold from being seen through the transparent enamel. I separated the two incisors with a file, and ordered a leech to the spot where the abscess had previously been, more as a precaution than from any immediate necessity.

September 16.—Filled to-day some teeth for the above patient's uncle, to whom she had been on a visit while in Swansea. He informed me that she had been perfectly comfortable since I saw her last, and had now returned home.

Miss. J. upon hearing that I was about to leave Swansea asked me to examine her mouth. Among other things which I thought necessary to be done, I found a tooth which I had plugged many years before, the gold having shown signs of wearing from mastication, I therefore removed it. I found the cavity healthy, except a little softening of dentine near the surface where a fragment of enamel had broken away. Sometime since, she had been conscious of some uneasiness about the tooth. Removed the incipient caries and manipulated a little, chiefly with a view of improving the shape of the cavity, in order to give durability to the plug. While using a fine broach for the purpose and pressing with some force, it slipped from its place and broke through the thin wall of dentine into the pulp cavity. The immediate result of such clumsiness on my part was pain of rather a severe character, but which fortunately was not continuous; a small quantity of blood oozed through the perforation. Over this I placed a thin solution of gutta percha dissolved in chloroform, and then pressed in the gold and completed the stopping.

The next morning, to my great discomfort, the lady reported that she had suffered much pain and could not drink cold water, and warm tea also gave her pain. I begged for two days trial, as pain often continues for a short time after the operation, the result of irritation from cutting dentine in a healthy state.

At the termination of the period agreed upon, she stated that the pain was less acute, but still more than she could possibly bear. Consequently, I removed the plug, reduced a gnawing pain by the topical application of chloroform, and dismissed her with a little cotton in the tooth.

March 10, a week after. The tooth was so far restored that she feared to have it filled again. But the tooth, though easy, I found, upon examination after the removal of the plug, to be exquisitely sensitive to the slightest touch of the instrument. In order to defend the living dentine from the rude contact of the gold, I cut a thin section of dentine from the tooth of a walrus, and to render it pliant, I dipped it for a few minutes in hydrochloric acid, after washing it well to free it from all trace of acid, I cut it to the proper form, laid it at the bottom of the cavity and pressed the gold upon it. The commencement of the operation was painful, but was ultimately successful, so that when tested with cold water, it remained free from pain.

On the 24th, that is thirteen days after, my patient called and reported that for some days the tooth was easy, but suddenly (to use her expression) "something in the tooth seemed to give way," since which it had been very painful, but the night before the ache appeared to settle in the second under molar, which had been filled long previously, but which upon being carefully examined, was found to have a small carious spot which burrowed into the tooth and became complicated with the cavity already plugged. The latter I tore out and refilled the tooth, which bore the operation well, though severe pain was caused at first by the application of tra. camph. to the denuded cavity; but no inconvenience was felt upon pressing in the gold—which was leaf. Presuming that the pain felt was caused by this last tooth, I sent my patient away without meddling with the upper molar, the tooth in question.

On the 26th, I found the last mentioned tooth (upper molar) still severely annoying her. I again removed the filling, upon which, we were both cognizant of a slight but offensive effluvia. The gold which came in contact with the ivory-plate was slightly

darkened in color, which convinced me that, however careful I might have been in washing the plate, still some acid must have remained to the disadvantage of the tooth and risk of the operation, although the ivory plate was so perfectly and firmly attached to the bottom of the cavity, that I could not immediately remove it.

I now refilled the tooth temporarily with gutta percha stopping, which remained in without any deterioration until the 9th of September, when I found the small communication, through the floor of the cavity closed up by dentine. I now filled the tooth without any false bottom to the cavity. It bore the operation with impunity, and remained well when I last heard of it, and I have no doubt, but that it will continue to be permanently successful.

Mr. M. aged 16, had a first under molar, decayed upon the masticating surface, which had been unskillfully filled some weeks before, and from the period of the operation to the day he consulted me, he had no entire cessation from pain. I removed the plugging and cut out the caries, much of which remained round the walls of the cavity, carefully made and adapted to the bottom a thin section of ivory,* sufficiently stout to bear the pressure of the operation, from a tooth of the hippopotamus, and then packed in the filling. The tooth was immediately free from pain, and continued so up to the time of my leaving Swansea, which was many months after the operation.

I could give the history of many such cases as this last, viz. Painful teeth stopped with an ivory cap or false bottom to the cavity. I have for a long time preferred ivory caps over the pulp to gold, as being more congenial to the nature of a tooth, being itself a non-conductor of heat and cold, and therefore capable of being brought into close proximity with the nerve itself, an organ which, in my opinion, should seldom be destroyed in young persons.

In individuals past maturity, the pulp is a mere remnant of an organ and is itself often deprived of vitality, being strangu-

*This ivory was not treated with acid.

lated by the narrowing of the orifice at the extremity of the fang; but in young persons it is full of life and activity, and capable of restoration. When partially diseased, moreover, its passage through the extremity of the fang is so large, that, to destroy the pulp is to destroy, at all events to risk, the attaching membranes of the tooth, for it is difficult to limit the extent of inflammation we wish to excite so as to define the point where slough of the pulp shall take place, and to fail, is to excite a morbid action in the lining membranes contiguous with the external surface of the tooth, to destroy which, is to make the tooth an extraneous body. The sooner then that it is removed, the better for the general health.

The plan which I have generally adopted, in order to relieve the pain consequent upon an inflamed pulp, is first to observe, if the tooth be tender on being brought into contact with those in the opposite jaw; if this be the case, without any distinct looseness in the tooth itself, the result of an inflammatory action in the alveolar membranes. The tooth should be isolated from its neighbor, by the use of a file which should distinctly preclude any contact so as to interfere with the natural articulation of the tooth itself when the two jaws meet. In such cases, the use of the file to an exceedingly painful tooth, is less disagreeable than the same application to a more healthy one, and relief is apparent immediately upon the decided separation of the tooth from the other. Upon this being completed, I return to the cavity and proceed to remove as much as possible of the superincumbent gangrenous osseous tissue, by taking off the pressure from the confined and swollen pulp, to allow it to have free scope for its increased dimensions. This is easily done by means of sharp excavators; but should the tissue be hard, the pulp being exposed only by an almost impervious opening, I generally use a rose drill hollowed in the centre, or a broach similarly constructed so that I can cut all round the chamber without injuring the pulp. Having proceeded sufficiently deep, the bottom of the cavity should, if possible, be removed in one piece, care being taken that no splinter or spiculæ of dentine be

left in contact with the irritated pulp; for I believe this is not unfrequently the cause of an unsuccessful treatment.

Having giving room to the pulp to relieve itself by swelling, I endeavor to reduce any irritation which may continue by the application of either saturated tra-camphoræ, chloroform or camphorated chloroform, to both the exposed pulp and soft tissues of the mouth near the seat of pain.

Having obtained relief, which I think is generally certain of being procured under careful and light manipulation in no lengthened period; I warm a little gutta percha stopping, over a spirit lamp and press it gently in, being cautious not to press upon the already too excited pulp, and secondly, careful to be certain that it hermetically seals up the cavity, and precludes the admission of external irritants. Should there be any amount of inflammation about the gums, special cases may require the local application of a leech. The use of a lancet, except for the exit of confined pus, and some very extreme cases, I do not admire, believing that the small quantity of blood so drawn off will seldom compensate for the irritation produced, together with the more rapid and increased tendency of blood to the part, in order to supply the place of that which has been taken away.

A week after, unless pain brings them earlier, I generally expect to see the tooth under treatment again, and judge according to circumstances, how far it may be advisable to fill the tooth immediately or postpone the operation.

Many have attempted to express which they think the most successful way of manipulating with gold, but as far as my own experience has gone, I feel myself unable to tell, until I see the cavity I have to fill, how to handle the material. One of the most favorite modes with me is, in large cavities, to put in the gold either in the form of a bundle of rods, the foil being rolled into the form of wire or doubled up into flat plates. The latter I prefer where the walls of the cavity are not too strong, since they can be laid side by side, each pressed laterally, without any excessive force. I think this latter has been one of my most successful methods, where there has been some

anticipated difficulty, such as a shallow or anomalously formed cavity. *Apropos* to a shallow cavity, I would remark, that a hollow rose-drill will be found valuable, since it will excavate the tissue deeper around the circumference of the cavity, and permit the dentine to remain in the centre where it is most needed, the angle formed by this means at the circumference at the bottom of the cavity, will assist rather than otherwise to add firmness to the plug.

Much has been said as to the relative value of the different materials used in stopping. Gold foil is too well known to require a remark since it stands, by experience, pre-eminent.

A word on spongy gold, which Mr. Tomes, when he first advocated it, thought would rapidly supersede the use of foil. Of this material, there are three sorts which have been supplied to me. The first was in the form of a coarse granular powder. It was made by Makins, and supplied me by Messrs. Ashton. With this I filled several teeth, some of which I never heard of again—but two I have lately seen, being a year after they were done. I was very glad to have the opportunity of removing the spongy gold and replacing the plug with foil.

The second form is of Messrs. Ash's own preparation. It is in the form of small nodules of brown porous-looking gold. This, for some time, I was rather inclined to like, I filled with it many teeth, but ultimately came to the conclusion that it was uncertain. Two conditions were absolutely required, a *large cavity* and *perfect freedom from all moisture*, although I could point to fillings of this kind which for firmness and strength, I could not surpass with any but the finest foil, yet the uncertainty of the operation induced me to abandon it also. The third is in the form of stout leaf, of this, I received but a small quantity through the kindness of my friend and relative, Mr. Rogers, of Newbury. This he had direct from Mr. Makin, who, now, I believe, does not continue to supply it from press of other business. With this I filled only two teeth, one of which I have been able to keep in sight. Up to the present time, this filling is as perfect as when put in, but I think I could have made a better finished plug with foil. This might and probably

does arise from want of experience in its manipulations; but the great drawback appears to be in the fact, that, wherever the instrument has pressed, no cohesion of particles can take place, thus precluding necessary manipulation. This, together with deterioration to the plug, by the accidental presence of saliva, particularly, if much mucus be present, is more than compensation, I fear, for the solitary advantage proposed, the greater ease with which it is inserted.

The next stopping which is used, claims attention, if not from its quality, at least from the *quantity* that is used. I mean the mercurial pastes, which no doubt in England are too greatly abused; an abuse that will exist until mammon cease to reign. But I cannot say, that I think it can altogether be superseded, and to substantiate my opinion, I will mention the two following cases:

Twelve years since, Miss A. came to me at Swansea, suffering under the most excruciating agony in the first under molar. Relief was given by the excavation of the gangrenous dentine, and the topical application of camphorated spirits. Without doing more, I put into the cavity, which embraced the whole of the masticating surface, a ball of silver amalgam. A week after it came on, I took it out, the tooth being totally free from pain since the first manipulation, I continued the operation of excavating the decay, and replaced a plug by a similar material. This continued in firm, strong, and *ugly*, until last year the tooth was extracted by a surgeon by mistake for a posterior neighbor.

The second case is more recent, and one which, by all the rules of our science, should be filled with gold. It was a front upper lateral, decayed at the back quite through to the enamel, and when cleared out for filling was almost severed in too, the quantity of dentine which remained to unite the apex of the crown with the base being only a small portion on one side. Since the filling could be seen through the transparent enamel, I fitted very accurately at the bottom of the cavity a thin section of ivory, which I afterward changed for white paper, and then put in the gold in the form of thin flat plates, pressing

them laterally so that they should all stand vertical to the cavity. I succeeded in getting the gold firmly in, and was proceeding to consolidate the mass when having spent about an hour operating as cautiously as I thought the case demanded, I saw a crack fly across the enamel. What was I to do? Others might have succeeded better; but what I did is soon told. I took out the gold, an operation itself which greatly risked the tooth, placed a piece of paper and filled with ash-cement, (which I apprehend to be very analogous to that given by Mr. Robertson, in the Journal for July.) Some months have passed away, and the tooth, I have heard, has been so far preserved, both with color and comfort.

It appears to me that owing to the extremely fragile nature of the remaining structure in both these cases, if cement had not been used, two teeth would have been sacrificed. But as I before remarked, all this is no excuse for the great lengths to which the abuse of amalgams have been carried. Had there been no amalgam, the empirical dentists would not have been so numerous, and if upon no other ground than for the elevation of a professional standard, I would urge the expulsion of mercurial fillings from the practice of dental surgery.

The last stopping which is much used is tin, this I hold in low estimation, since it has not one redeeming point but cheapness. If it is used on a masticating surface, it will wear rapidly away, if upon a lateral, it becomes dark, often nearly black, if it be used for a large cavity, it, for a long time, by the action of the saliva, gives an unpleasant liquorish taste to the mouth.

My own feeling, is to expunge it entirely from adult practice. I think, perhaps, sometimes it might be made available for the preservation of the teeth of the deciduous set, since they are only valuable for a time, and it would generally be well to avoid placing in the mouth of young children any mercurial compound, but even here I often use gutta percha stopping in preference to others.

8 *Mulgrave Place, Plymouth, England,*
October 23*d*, 1852.

ARTICLE IV.

Another European Principle Americanized. By Wm. M. Hunter, M. D., Cincinnati, Ohio.

In the year eighteen hundred and fifty-one, a gentleman of Cincinnati, during a visit to Europe, employed a Parisian dentist to supply the two inferior bicuspid teeth of the right side, together with the left anterior bicuspid of the same jaw, which operation was performed by carving the teeth and the plate (so to speak) very neatly from the bone of the hippopotamus. The fit was admirable, and the finish unexceptionable; the novelty, however, of the work consisted in the method of retaining it in the mouth, which was as follows: After the piece was fitted, four holes were drilled into the bone on the sides approximating to the natural teeth at a point opposite their necks, into which were inserted cylinders of hard wood, protruding just sufficiently to produce the amount of pressure necessary to retain it in place; unfortunately, however, the natural teeth were separated, and the continual pressure of each new plug rendered necessary by the yielding of the teeth, caused an opening that the artificial teeth would no longer fill, and another contrivance became necessary.

Seeing the principle, and the evil results of its application in this case, it required but very little thought to overcome the difficulty, and the consequence is, an application of the principle to gold plates with entire success, by means of tubes soldered to the plate at proper points and filled with compressed wood.

The advantages in many cases must be apparent to the thinking dentist, but, perhaps, it might not be amiss to enumerate a few.

The fixture is held in place with greater firmness than by means of clasps.

In some instances where I have used clasps, I have also used the tube in combination to give stability for masticating purposes.

The injury to the natural teeth must be much less, owing to the smaller amount of surface in contact.

If decay should take place, it would require but an ordinary filling to restore the tooth.

It prevents that peculiarly disagreeable sensation experienced, particularly in fruit season, upon removing and replacing artificial teeth.

After having tested it for more than a year, I am satisfied that it greatly lessens the chance of decay in those cases where it can be applied, and I have removed the clasps in some old cases with great satisfaction to my patients.

My method of applying the tubes, is as follows: After swaging; the plate, as usual, is tried in the mouth, and an accurate impression of the teeth to be used, is taken over the plate, as recommended by Dr. Arthur, in the American Journal, which will show the exact position of the tooth in its relation to the plate; after which the edge of the plate surrounding the teeth to be made use of, should be doubled or wired, when the tubes may be soldered at their proper points, taking care never to apply pressure to one side of a tooth without some means of counteracting the effect; that means being either a *sufficient number* of natural teeth contiguous to the tooth to be used, a counter tube, an arm of metal, or an artificial tooth, must depend entirely upon the nature of the case.

At times, it is well to tube but one side of the plate and clasp the other; in cases where the crown of the tooth is much larger than the neck, a beautiful application may be thus made.

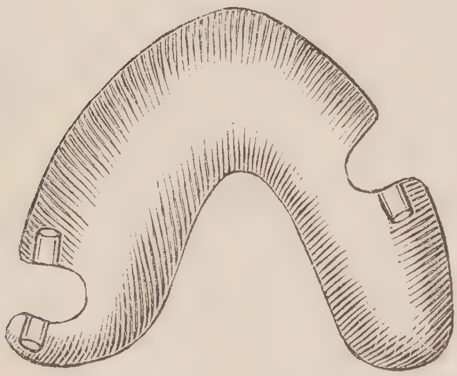
The tubes should be from one-eighth of an inch down to one line in diameter, and should be filled with whiting before applying heat to prevent them from filling with solder at the time of soldering to the plate. They should be placed upon the plate so carefully, that the mouth of the tube will come in contact with the natural tooth, as it is desirable to have the wood protrude but very slightly beyond the orifice.

Where it can be properly done, the tubes are soldered at the same time the teeth are, as it saves much trouble in fitting; it cannot, however, be very well done where it is designed to fit a

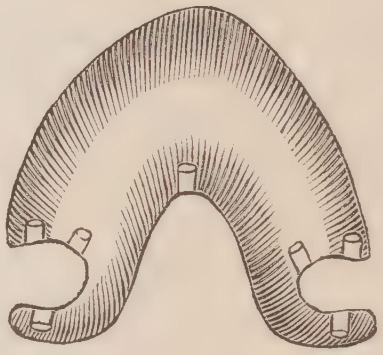
tooth over a tube, but can very readily be done where the tube is designod to fill the angle caused by the meeting of the stay and plate, in the incisors and canine teeth, and where a canine is used for a bicuspid, building over the tube with metal to form the inner cusp.

The annexed three cases will serve to exemplify in a measure the application. In case No. 1, the second molar of one side, and the second bicuspid of the other was used, the posterior surface of the first bicuspid (artificial) being used for the counter bearing.

No. 1.

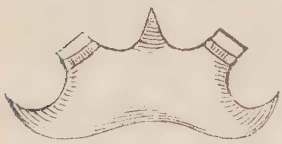


No. 2



In No. 2, the wisdom teeth were used, and after more than a year's wear, I am convinced, that the same service could not have been rendered with clasps, the teeth are conical, notwithstanding which, the *grip* is of surpassing excellence.

No. 3.



No. 3, is a case made for a young lady, with a perfectly symmetrical jaw, and without a separation between the teeth, natural or otherwise. I was not willing to separate for clasps, so concluded, that as *the arch was perfect*, I would try it, and watch the case closely. It was with much reluctance that I applied the tubes in this instance, but time has proven that it may be done in such cases with perfect safety. It is not necessary, that any great amount of force should be exerted in any case to retain it properly in the mouth, an accurate assimilation of the appliance to the natural parts is absolutely required, as the tendency of the plate is decidedly upward.

Hoping that the principle may be of as great benefit to others, as I feel that it has been to my patients, I make it public. Wishing (though I fear not) that it may be used *only* by those dentists who have the skill to properly apply it.

ARTICLE V.

Osseous Union of Teeth. By M. K. Bridgeman.

The perusal of an article on the *osseous union of teeth*, page 333, of your number for January, of the present year, reminded me of a similar case which came under my notice some eight or nine years since. In this instance, it occurred with the *permanent* teeth of the *lower* jaw—the right central being united with the right lateral incisor.

The patient, a youth twelve years of age, was brought to me to have my opinion as to the propriety of removing the *left cuspid* on account of its projecting outwards; but as the sacrifice of this tooth was quite out of the question when the absence of the *left central incisor* would have made the mouth all that could have been desired in respect of form. This, however, was not consented to, and I have not seen the mouth since.

There appeared to be a strong superstitious feeling on the part of the mother with regard to the tooth, or rather teeth, in question; and although I ultimately obtained her consent to allow an impression to be taken, it was most reluctantly accorded, and was evidently so understood by the lad himself, for his unwillingness was little short of being positively refractory.

As I have not the power of sending you the *original*, I forward its most valuable substitute, a plaster cast of it "in situ," and I much regret not having succeeded in obtaining a more perfect one, still, under these circumstances, I considered myself fortunate in getting one at all. The posterior side shows

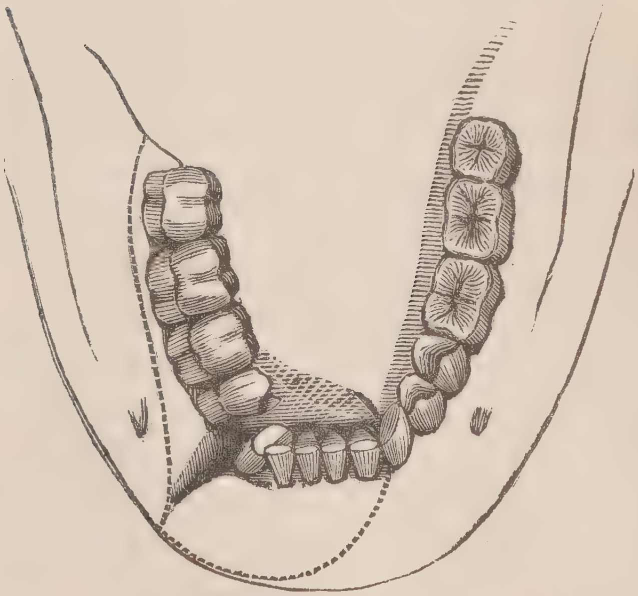
the line of junction more decidedly than the anterior, and at the lower portion of enamel just above the neck, it nearly disappears; for this I have no doubt but that there exists a less perceptible separation in the fang than the crown.

I enclose also a cast of an *upper right dens sapientiæ* with a small supernumerary tooth adjoining it. That it is really united to the tooth, I am quite positive; I convinced myself of this by passing a fine flat pointed probe between them, and by pressing the smaller one outward, both moved in concert.

Norwich, England.

ARTICLE VI.

Case of Compound Fracture of Lower Jaw. By Charles Brown, Surgeon Dentist, Brighton, England.



Lieut. V., royal artillery, was received into the Royal Ordinance Hospital with compound fracture of the inferior maxillary bone, caused by a kick from a horse in the riding school. I saw him the day after the injury, but could make no satisfactory examination, by reason of the tumified state of the parts, and the extravasation of blood into the sublingual tissues. I enjoined strict quiet, and exhibited a cathartic mixture. On the third day the tumefaction had sufficiently subsided to allow of an examination.

The blow appeared to have been given rather anterior to the external foramen on the right side, fracturing the bone completely across, (see diagram,) and taking a right and left oblique direction, upwards from the base of the fracture, and splitting away the inner alveolar plate and teeth as far as the dens sapientiæ on the right side, and on the left the alveolar plate posterior to the incisor and including the processus innomenatus; (see dotted lines,) thus dividing the bone into three distinct fragments.

A very shallow tin, charged with wax, was with difficulty passed over the teeth of the comparatively uninjured side of the jaw, and a slight impression obtained of their crowns, by the aid of which a model was executed sufficiently correct to allow of a metal capping being struck up in the usual way, and armed with a strong bar to bear against and support the detached alveolar plate and teeth. At our next visit reduction of the fractured portions was effected. The capping, with its bar, was adjusted in its place; a strong double tailed gummed bandage supported the jaw externally. Antiphlogistic treatment was adopted, and the case progressed to a satisfactory issue in little more than four weeks; a slight pucker upon the chin, where the blow took effect, and the loss of one tooth being the only remaining indication of the injury.

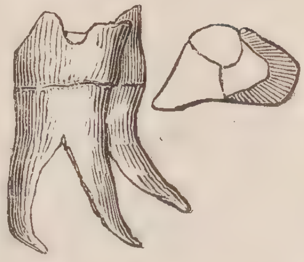
ARTICLE VII.

Tumor of two years standing Cured by Extraction of Wisdom Tooth. By F. C. Scott, Dentist, Swansea, England.

John Griffiths, aged 20, two years and a half since, whilst living about nine miles from Swansea, suffered from a slow fever, which greatly debilitated him. During his illness the dentes sapientiæ of the left side made their appearance, prior to which and afterwards he had severe pain on that side of the head, or

to use his own words, "a violent face-ache." The pain was more acute in the inferior jaw, and the gum from the first molar to the wisdom tooth was swollen and greatly inflamed. On being lanced, it emitted a considerable quantity of pus, and the pain lessened but did not entirely subside. A few months after, the whole side of his face swelled to a considerable extent, and so continued, notwithstanding the use of a lotion, which his medical attendant prescribed for him. About this time, (December, 1851,) he obtained a situation in a shop in this town, and the swelling having assumed a hard appearance, he applied to me. A surgeon here, who gave him an ointment, (what I could not discover from his description,) to rub on the side of the face, telling him at the same time that it was "a growth of the bone," and that in his opinion the swelling would never entirely disappear. After using the ointment for about six months, without any success, he determined to seek further advice, for, besides the annoyance, being naturally good looking, the idea of one side of his face being nearly twice the size of the other was the reverse of pleasing, so he consulted Dr. ——, a physician of this town, who immediately lanced it. A slight quantity of pus escaped, the swelling diminished, but matter was discharged continually, the incision being kept open for nearly three months. At this period the pain (from which he had never been entirely free) began to increase, especially in the superior jaw, and after a week of great suffering he called on me for the first time to ask my advice.

On examination of the mouth I found that he had not the slightest symptom of caries in any of his teeth, nor had he ever had one extracted, both jaws presenting the full complement; on closer inspection, however, I discovered that the wisdom tooth of the superior jaw was much misshapen, the crown presenting a triangular appearance instead of a square. I was fully convinced the pain arose from undue pressure, and consequently advised the extraction of both the wisdom teeth on that side, to which, however, he would not consent; but the next day the pain being worse, he came and asked me to remove the upper dens sapientiæ, which I did. Annexed is a sketch of the tooth,



the fangs being much curved and excessively sharp. Almost immediately after the removal of the tooth the pain ceased, but I could not then persuade him to let me extract the inferior wisdom tooth, which I strongly advised, for having been under the care of three medical men for nearly two years, with scarcely any relief, his face presenting an unsightly appearance, with a continual discharge, and as the removal of the tooth from the superior jaw had expelled the pain from that region, why might not the lower tooth have something to do with the tumor? However, another month passed by, and there being no sign of his face assuming a healthier aspect, Dr. —— recommended him to take my advice, and on January 4th, 1853, I extracted it. A slight quantity of pus escaped into the mouth on the removal of the tooth, which did not present any peculiar appearance besides the fangs being crooked posteriorly, as in sketch.

It is now nearly seven months since I extracted the tooth, the side of the face is restored to its original contour, and with the exception of the slight scar from lancing, nothing is discernible of the swelling that continued for upwards of two years, nor has he had the slightest symptom of pain since.

Velpeau relates a case of twenty months standing, where the patient could not open his mouth, and the tumefaction extended over the whole side of the face and neck. After forcing the mouth open, and keeping it so with cork and wood, the dens sapientiæ was extracted, and in six days after a piece of bone was discharged, the second molar was also extracted and a piece of bone again was removed, which had prevented the wisdom tooth from occupying its normal position. In less than three weeks he was quite restored, and his face had resumed its proper appearance. Mr. Tomes also relates many very instructing cases in his lectures on dental physiology and surgery.

ARTICLE VIII.

The Physical Condition of the Teeth. The causes which determine it, and as a consequence, the differences in the liability of these organs to decay. By A. A. Blandy, M.D., D.D.S.

The causes which determine the physical condition of the teeth, and as a consequence their liability to disease, constitute a subject of study in which every dental practitioner should feel interested. The public have a right to expect from him such advice as would, if followed, not only contribute to their health and preservation, but also, to their restoration, when they become the seat of actual disease.

It is most lamentable to witness the almost total want of correct doctrine and knowledge, pertaining to the true cause of disease, the relative condition, coequal formation, growth, connection and nourishment of the teeth, during the period in which they, as well as the whole body, are being formed and brought into practical life. It is doubtless, the fact, that ignorance concerning these points, permits the existence of a most fearful and growing cause of disease in the general system, as well as a *consequent* and *steady* increase in the diseases of the teeth, even more, perhaps, than results from bad and unskillful operations with the imperfect condition of the operative department of our art, on the one hand, or the improper administration of medicine arising from the imperfections of that science, and its frightful accumulations of petty quackeries on the other.

Were the laws properly understood which regulate the health of the body, the necessity for remedial applications would be measurably wanting, and vigorous health would greatly predominate. When society was less artificial, man's wants were few and easily supplied. Nature was not taxed to dispose of not only unnecessary but poisonous indulgences in food. His occupation produced the needed exercise, as well as a strong and

healthy appetite, requiring no other stimulant than wholesome food, to sustain the system. The functions of the body performed their duties regularly, a robust constitution was the effect of such temperance, with an almost total exemption from the epidemical and local affections, and the many minor evils that mankind are now laboring under.

The comparison of the present condition of mankind, is obviously bad and discouraging. From birth up to manhood or adult age, we are tottering on the brink of the grave, and time makes a sad impression upon the man, instead of ripening to a full development his physical nature.

Instead of the endurance and prowess of the ancient Athenian and Roman, we are dwindling down towards Swift's inimitable conception of small men.

The deterioration is not applicable to a part or peculiarity only, but is general and evidenced in each and every organ which constitutes a part of the body, not equally evinced but relatively affected, depending upon the temperament, hereditary proclivity and local influences surrounding the subject. The teeth, when considered in their inseparable relationship and minute, indicative structure, most forcibly establishes this position, to the consideration of which we shall confine our remarks.

That diseases of the teeth were rare occurrences with the ancients, is beyond all doubt, in view of the facts found either in history or in regular treatises of anatomy, medicine or surgery. We might cite, as an example, the leaden instrument mentioned by Erasistratus, which was found suspended in the temple of Apollo. Everything leads to the belief, that the temporary teeth furnished the most frequent cases for extraction. Hippocrates' attention was more directed towards the eruption of teeth; he merely confessed, that they were bony organs, a little more subject to vicissitudes from exposure, and that certain conditions of the teeth were symptomatic of certain maladies. Aristotle, the best of ancient anatomists, and the first to devote any close investigation to the teeth, confines his attention to their comparative anatomy, without a single expression which would indicate that they were ever in a diseased condition.

Celsus gives the first clue to any painful affection or morbid condition of the teeth, by reporting the advice given by Archigeneus, to perforate the tooth with a small trepan when it is the subject of pain. Then comes Pliny, who tells the fabulous story of the Cæsarian soldiers, who lost their teeth by drinking from a certain fountain.

Galen, Paracelsus, Acteus and others, describe their anatomical relationship, but mention little or nothing of their diseased condition, so that it is reasonable to infer that the existence of diseased teeth was rare, from the fact of such men reviewing much concerning them without treating of such a circumstance.

We are then justified in the assertion, that the universal prevalence of diseased teeth at the present time, is owing to some cause of more modern introduction, and notwithstanding the great Hippocrates formed some inefficient compounds for "fixing" the teeth, we find but little proof of the existence of a want or necessity for their application. That this is attributable to the better understanding of what constituted natural living, is not to be entertained for a moment, but to the unsophisticated mode of life, originating in the absence of effeminating luxuries or debilitating vices, for we find immediately upon their introduction, disease following inseparably in their train, and among the most prominent, is that of the teeth.

The formidable increase of general disease and the shortness of life, with the startling decrease in man's physical happiness, is owing to the ignorance of the laws which regulate the economy during infancy, and to this, is also to be referred the decay and premature destruction of the teeth, if not entirely, to a very great extent.

That the race has greatly degenerated, is evident in nothing more forcibly than in the difficulties almost always presented in the function of child-bearing, which has become almost a disease requiring treatment in many cases before and after labor, instead of as formerly, a healthy and natural process, wanting nothing but its fulfilment to develop the nature of woman.

It is almost incredible to us, that many of the hardy races, still in enjoyment of unsophisticated modes of living, go through this

process without the necessity for any assistance whatever, and without the least suspension of their usual industrial avocations, except it be for a moment of retiracy, sufficiently long to wrap the little stranger in a warm covering. Witness the account of travellers in Tartary, who state, that nothing is more common than for a woman on a journey to descend from her horse, retire a short distance from the path, give birth to her offspring, suspend it by a sort of shawl from her neck, remount and proceed onward, and all this, without the assistance from any living creature. Subsequent travelers confirm the fact among many Indian tribes.

Thus, we find nations in natural conditions, untainted by the luxuries of perverted tastes, strong and active, free from disease of body, and from such vices as are created by our more artificial state, whose progeny are not only longer lived, but who are stronger, larger and more healthy. Witness this condition of things in the mother of the present day, in comparison with the same state in the simple nature. She is, perhaps, frequently bled and physiced, blisters and plasters used, obliged to keep her bed a great part of the time, her appetite is so dainty, that nothing will satisfy her cravings, that is in the least wholesome or natural. Her duties in life cannot be fulfilled for fear of ruptures and accidents from unaccustomed positions. Nature's gambols and freaks, are all hidden from her, even nature itself shut out for fear of impressions being made upon the fetus through the great susceptibility of the mother's nerves, and her usual avocations mostly suspended, and all these miseries arise merely from a direct opposition to the laws of health.

Hereditary tendencies are strong and almost indelible, but they can be so carefully avoided and directed, as to become scarcely perceptible and wholly harmless, by such care and attention as are within the reach of every one possessed of ordinary intelligence, and a sufficient character, to follow the dictates of reason; for the dangers of all tendencies imparted at birth, are not great in themselves, but only so, as they are encouraged by silly customs of society, or by the weaknesses of

parents, granting to their children the luxuries which brought these very evils into existence, or by the indulgence of habits, whose effects are opposed to the continuance or establishment of health.

By avoiding these causes, we find the aptitude to disease wholly eradicated. The physical construction of teeth may be strongly urged in opposition to these views, as to this is justly attributed the great amount of decay in the teeth. Thus, peculiar depressions, corrugations and irregularities are often transmitted through several generations, affording lodgments for the acids of the mouth, and particles of decomposing food, &c., producing the disease to which all teeth are more or less liable. But this fact is overlooked, that had the proper precautions been taken in due time, principally while the organs were in their formative stage and after eruption, the peculiarity of form would have been much changed, and their composition capable of resisting all corrosive agents, and by carefully continuing a rational system of hygiene, each successive family would fall heir to improved constitutions and more perfectly developed teeth, both as regards beauty and structure, rather than to the impaired constitutions and the irregular and defective dentures, now almost universal.

Again, it is often overlooked that the body is a unit, inseparably one, so that its integral parts cannot be effected by morbid change without implicating the whole structure. The connection may be imperceptible, but still not the less certain; for the chain of sympathy is most wisely and effectually entwined and interwoven with each tendril of the human frame, thus reciprocating each and every change of its most distant parts, so that with a defective change in the form and structure of the teeth, we have a certain indication of a defective change in some connected part of the system, which must produce an addition to the already existing causes of decay or disease in teeth which are not able to resist the before existing causes of morbid change.

Let us, for example, admit, for the sake of argument, but which, it must be remembered, is impossible, that we have a

perfectly healthy constitution, but teeth defective in structure, which, with much care, will prove serviceable through life. Now, impair this constitution and the teeth will fall the first sacrifice, and by their loss will the system be less able to resist the disease by which it is oppressed, thus each change is as a compound misfortune entailing destruction upon its victim and his generations.

In the enumeration given by the most valued of dental authors of the causes of decay in teeth, it is stated to be the result of the action of chemical agents, such as vitiated saliva, putrescent particles of food, acids, corruptions of the fluid by which these organs are nourished, states of the general health, mechanical injuries, rapid variations of temperature, &c., but the worst and most fruitful source is, unquestionably, *the imperfection of structure.*

Teeth, whose constituent particles are defective in their proper relative quantities, are peculiarly subject to the action of all agents, irrespective of all other considerations, as they cannot possess the power of resistance, but yield at once to decay, so that it is an infallible evidence of the predominance of the organic material, when teeth are found affected by caries or any other disease, as it is also, of an enervated and impaired constitution; and on the contrary, teeth that are free from decay or disease at an advanced age, bear certain and undeniable proof of their possessing the proper quantity of organic and earthy salts, as well as of the existence of a sound and firm constitution.

Mahon, Delabarre, Jourdain, and others, clearly acknowledge the doctrine of great morbid sympathy existing between the teeth and the general system; that defective and irregular teeth are conclusive evidences of an unsound constitution, in our opinion, arising principally from other causes than hereditary tendencies, or from a greater one than want of cleanliness, found in the utter disregard that is universally entertained by parents, of the requisite food to be taken during the time these organs are in their embryonic stage until they are developed as perfect teeth.

It is rare, if not impossible, to find a mother who entertains the slightest opinion founded upon reason, of the food which should form her diet, before and during pregnancy, or who apprehends the least consequence to her offspring from a gloated appetite which is often so vulgarly and foolishly encouraged.

* "When a larger quantity of food is habitually consumed than the wants of the system require, it is not converted into solid flesh, but is got rid of by the various processes of excretion. The increased production of muscular fibre depends upon nothing so much as the exercise of the muscle. It cannot take place unless the blood supply it with the materials; but no degree of richness of the blood can alone produce it; consequently, the accumulation of nutritive matter in the blood is, so far from being a condition of health, *that it powerfully tends to produce disease*, either of an inflammatory character, if the fibrin predominates, or of the hemorrhagic character, if the red corpuscles predominate. This state is most apt to present itself in those who live well and take *little exercise;* and the remedy for it is either to diminish the diet, or to *increase the amount of exercise*, so as to bring the two into harmony."

To this most of our readers will doubtless subscribe, and every practitioner will be able to recall to his mind, many ludicrous tales whispered during a professional visit, of a strange fancy for this and that rarity impossible to obtain, and as impossible to digest, which is presumed to arise from the little unborn sufferer's existence, and to which is popularly yielded a consideration as hurtful as it is ignorant. It is frequently seen that where more than usual intelligence is found in the maternal guardian, a degrading concession is yielded to a depraved appetite, and a weakened system is still further taxed by poisonous indulgences, not only incapable of affording the right nutriment to the fetus, but absolutely such as will overwhelm it with corrupted matter, and that, too, at a time when the most important process is going on; for it will be remembered, that the teeth are all in such a condition as to readily receive

* Carpenter's Phy.

the least morbid impression, the permanent growing in their sac condition, and preparing the secreting vessels which deposit osseous matter during childhood, and the temporary, absolutely undergoing this operation up to the period of birth, when they are found ossified.

A very popular writer states that, "we often do our bodies great injustice by attributing to them the low appetites and perverted passions, which really belong to a degraded, spiritual nature. We see by the most striking examples, that what are called bodily indulgences, are not good for the body—are not what it demands; that simple, even coarse fare, much active exercise and exposure to what we might consider hardships, suit the body much more than luxurious habits and dainty fare."

Look at the lists of mortality amongst children; see that *one* in every *three* dies before the fifth year, and mostly those ushered into life amidst the luxuries of fashion and miserably applied wealth, certain is it then, that the condition which alone renders the child vigorous at birth, is neither understood nor sought after; a strong circumstantial proof that this mortality is the immediate result of improper living is, from its direct supervention, as hereditary entailments, even when unopposed, require time for their development.

No one, who has given this subject its needed consideration, can doubt that the physical education of the child commences with the pregnancy of the mother; and equally certain is it, that one of the greatest and most active labors of nature during this period, is in the development of the dental apparatus. The elaboration of materials for the teeth; the secretion of such an infinite admixture of foreign matters through a duplication of means, as it were; the necessity of nature's efforts to perfect, in time, this wonderful growth, and its abject dependence upon proper supply from so doubtful a source; the harmony of consent nature always requires in her perfections, which in this process, from named causes, is seldom, if ever granted; the visible struggle, reasonably inferred of the development, and of the eruption of the teeth, all go to show that nature's greatest labor in infancy is with the dental apparatus.

The remarkable and intimate relationship between the child and its parent, renders their well-being inseparable, and greatly subject to corresponding changes. The influences affecting the mother must be received by the child, and indulgences or habits which, under ordinary circumstances are, to say the least, doubtful to her, must inevitably tend to affect the child injuriously. In a word, whatever affects the health of the parent, must, as an infallible consequence, affect the child, whether the cause be of a physical or a mental nature. No longer can the fact be questioned, that improper kinds of diet, and irregularities of living in the mother, produce the most baneful effects upon the unborn child, resulting in the birth of weak and debilitated children, possessing, as a natural consequence, a defective denture. How can it be otherwise, when we find that even the mental peculiarities of the mother most strikingly affect the child. That the existence or cultivation of peculiar disposition and temper is often exhibited in the child after birth, look at the analogy of this in the lower animals.

The training of the parent is astonishingly exhibited in the young which have been entirely separated at birth, without the process of instruction, and which yet possess not only the cunning and tact, but also the voracious appetite for similar food. A writer who deserves, and will become highly popular, comments very instructively in the following manner, upon this subject: "Surely the wise mother, who can recognize the high and important use of the necessary cares, will not neglect to adopt them with a never failing accuracy. For the favoring influences affecting the offspring are constantly present in the daily life of the mother, forgetting not that a cheerful spirit, enlarging the happy prospects of the future, will throw an endless sunshine in the features of her unborn child. That these important rules of hygiene, regular habits, early hours, periodic exercise, cold bathing, plain wholesome food, loose comfortable clothing, so easily understood, so simple in their nature, so easy of adoption and so important in the favoring condition of growth, as must impress every woman of sense with their indispensable nature, and no *true mother* will allow a frivolous pleasure, petty

cares, or even much cause for sorrow, to interfere with these healthy rules of life, or disturb the laws laid down in her system for the purpose that she should fill her sphere in creation."

Again, we will suppose that a child is born of perfectly healthy parents, whose care has been scrupulously directed. At birth it may have all its temporary teeth perfect in form and component parts. Its permanent rudiments are all in a perfect state. Now, if the laws regulating its food are accommodated, the condition of the one will remain in tact until nature calls for their displacement; of the other, the materials will be just and properly supplied, neither too much of the earthy or too little of the animal tissue, but that combination capable of resisting all destructive influences. The general health of the child will remain good, its whole system will be developed naturally; no febrile action from an over-taxed stomach will operate injuriously upon one organ in suspending its growth, stinting its nourishment and making it the weak point of the system; the jaws will be sufficiently developed to admit, without crowding, all the teeth in their proper position; the fluids of the mouth must be perfectly healthy, and here we have a condition of things which will allow the teeth to remain free from disease, with proper cleanliness, for twice the number of years mankind are permitted to enjoy.

That the diet of a child is closely regulative of its existence, is proved by many public facts—for instance, Mr. Thos. Bull, in his work upon the maternal management of children, states the case of a mortality so great in the work-houses of London, among the infants, as to attract the attention of Parliament, which instituted such an improvement in the matter of diet, cleanliness and clothing, as to reduce the number of deaths from 2600 yearly to 450, rendering it certain that 2150 lives were lost annually, from the traceable ignorance and mismanagement of children.

[To be Continued.]

ARTICLE IX.

Spontaneous Inflammation of the Alveolo-dental Membrane.
By Chapin A. Harris, M. D., D. D. S.

About three years since, Miss T., a maiden lady, thirty-five years of age, of a scrofulous habit, applied to me to extract a lower molar, which had been the seat of severe pain for some six or eight weeks. Perceiving, on exmaination, that the crown of the tooth was sound, I recommended the application of a leech to the gum. This did not mitigate the pain in the slightest degree. As the crown of the tooth was free from caries, and the character of the pain did not indicate inflammation of the pulp, I suspected it arose from the action of some constitutional cause, and advised her to consult her medical attendant before submitting to the operation of extraction. She followed my advice, but before the treatment which he instituted had produced any effect, the pain became so intense, she called upon me again, and this time, at her earnest solicitation, I removed the tooth. The roots, on examination, were found to be covered with thin blood, of a dark purple color, which had seemingly been effused through the coats of the small capillary arteries distributed upon the periosteum.

A few weeks after the removal of this tooth, I was requested to extract the corresponding molar on the other side in the same jaw, and under precisely similar circumstances. I again advised the application of a leech, and such other constitutional treatment as the state of her general health, might, in the opinion of her medical adviser, seem to indicate. But as she had already suffered severe pain from it for more than two weeks, I could not persuade her to have the operation delayed. The roots of this tooth presented the same appearance as those of the other.

Seven or eight weeks after the last operation, she visited me again. Two other teeth, an upper molar and a lower bicuspid,

had become the seat of constant, gnawing pain. Both of these teeth were slightly affected with caries, but the structural alteration had penetrated but a short distance into the dentine, and could have had no agency in the production of the pain, which, as in the two former cases, was evidently the result of periodontitis, and that not caused by any other source of local irritation than the mere presence of the teeth, but dependent upon great preternatural irritability of the periosteum, arising from some peculiar cachectic habit of body, or state of the general health. Entertaining this view of the case, and not wishing to interfere with the general treatment which seemed evidently to be indicated, I advised her to have leeches applied to the gums of the affected teeth, and to place herself under the care of her physician, to whom, at her request, I addressed a note, expressing my opinion with regard to the cause of the pain from which she was suffering. As she resided in the country, some twelve or fifteen miles from Baltimore, I had great difficulty in persuading her to return with the aching teeth in her mouth, but yielding to my solicitations, she finally consented to do so. She returned immediately, sent for her physician, and was at once put under medical treatment, which was perseveringly continued for about seven weeks. During this time, aperients, tonics, such as quinine and the various preparations of iron, counter irritants and narcotics were prescribed; but the pain continued without any mitigation, and in the meantime, extended to two of her other teeth. It had become so agonizing, that she was unable to obtain any sleep at night, except when under the influence of large doses of morphia, and despairing of relief, she again visited the city, firmly resolved to have the four aching teeth removed. Her suffering was now so great, that I no longer refused to perform the operation. The roots of these teeth presented the same appearance as those of the two first.

Miss T. left Baltimore, the day after the operation, comparatively free from pain; but the sockets remained sore, and at times, slightly painful for several weeks.

About three months after the removal of the last teeth, another began to ache, and in about three weeks, the pain

having assumed such a degree of severity as to render its longer endurance almost insupportable, she came to the city and had the tooth extracted. The loss of this procured a few weeks freedom from pain; but in a short time, another was seized, and was ultimately removed. In this way, tooth after tooth was attacked and extracted, until at the expiration of about eighteen or twenty months, all of the molars and bicuspids, except one, of both jaws, were removed.

Believing that the extreme irritability of the alveolo-dental periosteum, which seemed so great, that the mere presence of the teeth acted as irritants, arose, principally, from a scrofulous diathesis of the general system, I suggested the use of iodide of potassium. This was tried, beginning with two drops a day of Lugol's solution. The dose was gradually increased, until the whole system had become, as it were, completely saturated with it, but with no better effect than the remedies which had been previously prescribed. The inflammation soon extended to the sockets of the remaining teeth, attended by the most agonizing pain, and one after another was removed, until not a single tooth remained in either jaw.

The roots of all the teeth presented the same appearance, and what seemed very remarkable, the inflammation at no time extended to the gums; this structure exhibited no indication of increased vascular action, but retained throughout the whole progress of the disease, a pale, bluish-rose-colored tinge; their margins were thin and regularly festooned. The pulps of the teeth were also free from inflammation, and the hard structures of the organs were, for the most part, free from caries. Some six or eight were slightly affected, and four had been filled, but in no instance, had the disease extended to the pulp-cavity.

Up to the time of the development of this most singular affection, the patient had lost but six teeth; the remainder, twenty-six in number, were removed in a little more than two years.

ARTICLE X.

Professional Etiquette.

My Dear Doctor,—May "a friend in difficulties" take the liberty of applying to you in a dilemma, to her most embarrassing and unaccountable; and can you spare a moment of your valuable time to give the desired information? Your well known devotion to the gentler sex, assures me that I will not be overlooked merely because I am a woman, but I know you have so many other more important matters to attend to, that I shall esteem it a great favor, if, in the press of business, I am not altogether overlooked. Trusting, therefore, that some day my feminine appeal may be remembered, I will proceed at once to state the difficulty I have encountered, well convinced that if any one can explain the matter, it must be yourself.

Fortunately for me, dear doctor, I have so far altogether escaped the delightful sensation of taking my first seat in a dentist's chair; nature, in a liberal mood, having provided me with so perfect a set of masticators, that I have been altogether independent of your skill, and able to look on forceps, pullikins, lancets, and all the keen paraphernalia of your private inquisition, with a coolness and composure quite aggravating to those of less happy experience. No little blue bright blade, with its jeweled handle, and other insolent mockery of ornaments, made me shudder, as it awakened recollections of the past days and hours of torture.

This state of things, however, was too good to be permanent, and a short time since, just on the eve of what may be considered the most important event of my life, I discovered, to my dismay, symptoms of rapid decay in my central incisors. Here was a pretty condition of matters. Those teeth were of incalculable value to me. To say nothing of their usefulness, they had always taken a prominent place in any little compliment addressed to my personal appearance, and indeed, in sea-

sons of low spirits, I was sometimes haunted with the idea, that there might be more truth than flattery in the remark of some ill-natured people, that they were "my only beauty." Certain it was, I could not afford to lose them, and without daring to look that possibility in the face (only think, doctor, what it was—the loss of lover, husband, the wreck of the heart's best affections, then "cold inhumanity, burning insanity," &c., &c., all hanging on two teeth.) I hastened to your city, determined to endure any thing, every thing, rather than lose them.

There, on inquiring for the most eminent dentist, I was, of course, directed to you, and with a firm resolution to "suffer and be strong," I rung your bell. Alack! you had left town on business, and would not be back for "ever so long," so, with "a silent sorrow in my breast," I sought the residence of another practitioner, and he being at home, submitted to a lengthy inspection of my case, and tremblingly awaited his decision. The prognosis was rather favorable, and he named an early hour the next day for the operation. "But," he added, "it is fortunate you came to *me*—not another dentist in the city could save those teeth. No other understands the business. You see I have my own peculiar method, and though these quacks that you may meet with every where, hanging out their impertinent signs, may have temerity enough to attempt any thing, believe me, there is not one amongst them that knows any thing about the teeth." I must confess I was rather startled at this gratuitous piece of information, but left, inwardly congratulating myself on having so fortunately stumbled on the right man.

That evening, however, in a little social circle, I happened to meet another member of your profession, and innocently detailed to him my adventures of the morning, and mentioned my engagement for the next day with Dr. No. 2, as I will call him.

"What!" exclaimed my new acquaintance, perfectly horror-stricken, "you are not going to let that incorrigible ignoramus operate on your teeth? Why he don't understand the first rudiments of his business."

"Oh!" I answered, "he has his own peculiar method," &c.

"His own peculiar *humbug*, Miss; the unconscionable don-

key. A pretty sight you will be after you leave his hands;" and

> "There stood the rogue and roared,
> Unasked, and unencored,"

whilst I was ready to cry with vexation.

Of course I determined to leave Dr. No. 2 and take No. 3, since he declared "that it was universally acknowledged by every person capable of forming an opinion on the matter, that *he* alone understood dentistry in all its branches." My troubles, however, were not at an end. The next day, previous to the hour of my appointment with Dr. No. 3, I met a friend in the street, who, as it happened, was on the way to her dentist, and at her earnest solicitation I accompanied her thither, without, however, having any intention of breaking my engagement with Dr. No. 3. But my friend, as soon as we were ushered into the presence of No. 4, thought proper to mention it to him, and I was really startled by the deep resounding groan that burst apparently from the bottom of his heart, when he heard of my rashness and danger."

"Poor child," he ejaculated, shaking his head dismally, "poor child! poor human nature! how constantly it is imposed upon. Oh, it is sad to think how utterly depraved that heart must be, that can deliberately plan and execute an irreparable injury upon a fellow creature. for the sake of a little filthy lucre, the root of all evil. Why, my dear child, that fellow will ruin your teeth to a certainty. What does he know of dentistry? He has not the mind to comprehend it; and if he were to study from now until the age of Methuselah it would make no difference in him. Plugging teeth is an art and a *mystery*, and it takes nothing less than an inborn natural genius to comprehend it. Now believe me, I have no ill-feeling towards Dr. No. 3—no wish to injure him, but as a christian man, I cannot bear to see my fellow creatures imposed upon, and I happen to possess a little specimen of his work which I will show, and you may form your own opinion;" and with this Dr. No. 4 produced from his case, a full set of porcelain teeth, which he declared was an "unusually good specimen of the work of Dr. No. 3," and laid them before us for examination.

Now, doctor, I am, by no means, a judge of these things; but, if those teeth were not the identical set which belonged to poor Dr. Parkman, rescued from the fiery furnace after they had been roasting there for a week, (was it?) they certainly were a fac-simile of the same, and unmistakably, had gone through a similar process. Still, our christian friend, assured us, that he had taken them as they were, from the mouth of one of Dr. No. 3's "victims," and benevolently enlightened us as to any defects that might have escaped our observation. How the "victim" ever got them into his mouth *as they then were*, or being there ever got them out again, must ever remain a mystery to me, and, indeed, if Dr. No. 3, ever did accomplish this, he might turn a pretty penny, by going around the country, and making it a public exhibition for the curious.

Of course, my faith was now shaken in Dr. No. 3, but still, it was by no means established in No. 4. He had overacted his part, and I determined to try again. Here, dear doctor, was but the commencement of my difficulties. Every where I went, and every where I heard the same complaints, the same mutual accusations, the same charges of ignorance, selfishness and cupidity, until I returned home perfectly amazed and disgusted, not knowing what to do, or whom to trust.

Now, doctor, the question is, why is this? What has originated this state of ill-feeling amongst the members of your profession? Other men engaged in the same pursuits, manage to jog along without apparently desiring to disparage all others, or gain a monopoly of custom. Physicians even, do not invariably speak against each other, but often meet in amicable consultation, and suck their canes, and more bedarken a difficult case, in the most good natured obscurity. Even druggists, are not always sworn foes, and can meet and say, "art thou well, my brother?" without a stab under the fifth rib. Then, why is it, that there is so deadly a feud existing between dentists, and why are they so willing to crush one another? I know that many ignorant pretenders have crept into your ranks, men, unwilling to learn, and incapable of understanding their profession, who do incalculable injury in the community, and

only deserve contempt and ridicule; but it is not to these I allude. It is to the better classes, and again I ask, why is it?

Yours truly, KATE.

To Dr. C. A. Harris.

Long Green, September 15, 1853.

We will reply to our fair friend under the editorial head.

C. A. H.

ARTICLE XI.

Single Porcelain Teeth Mounted on a Socket Plate. By Chapin A. Harris, M. D., D. D. S.

The liability of the platina pins in single porcelain teeth to break or be drawn from the teeth, is well known to almost every dentist. The frequency of its occurrence is often a source not only of serious inconvenience and great annoyance to persons wearing dental substitutes composed of single porcelain teeth mounted on a plate, but also of much trouble and vexation to the dentist; for oftentimes, in replacing a single tooth, when it becomes necessary to do it with solder, several others are cracked or broken. Besides, in heating a piece after it has been worn, there is always danger of springing the plate and destroying the accuracy of its adaptation to the mouth—an accident, which, in some cases, can only be remedied by reconstructing the entire apparatus.

The best translucent porcelain teeth that are made when mounted on plate in the usual manner, sometimes break or have the platina pins drawn, owing to the vascillation to which they are subjected in biting and mastication; and even when the pins do not loosen or give way, the backings, connecting the teeth to the plate to which they are attached, sometimes break. The force applied to artificial teeth in the mouths of some persons is so great, that it is impossible to prevent them from being

shaken more or less, when not held in place by some other means than the backings which connect them to the plate.

To obviate these difficulties, Dr. S. P. Hullihen, of Wheeling, Va., about seventeen years ago, contrived a kind of socket plate, by which the end of each tooth resting upon the base, fits into a sort of chamber. Teeth mounted in this way cannot be made to move perceptibly by any amount of force ordinarily applied to a dental substitute. It requires more labor, however, to construct a set thus, than in the usual way, but when completed, the piece is, unquestionably, worth more than double to the wearer.

Fig. 1.

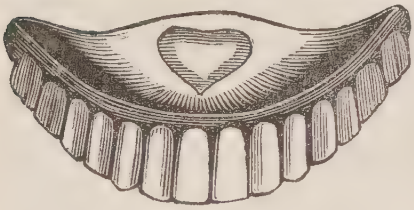
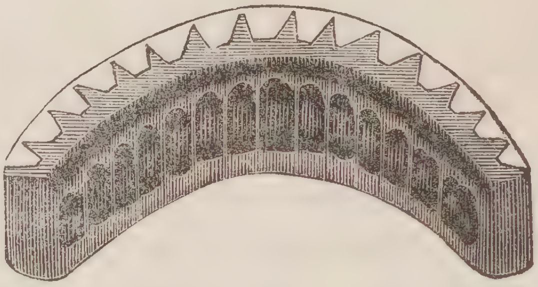
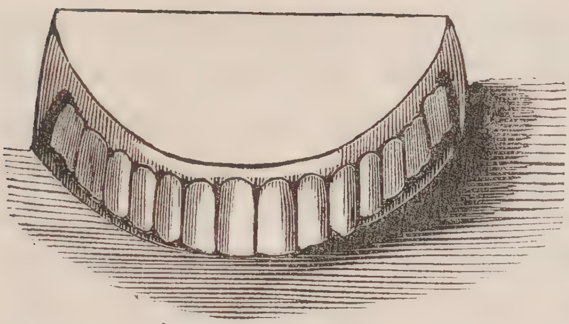


Fig. 2.



In mounting teeth upon a socket plate, the following is, I believe, the method of procedure adopted by Dr. Hullihen: The impression of the mouth, plaster model and metallic castings are obtained in the usual manner. The plate is then swaged, the teeth selected, arranged, fitted, and retained in place by means of a rim of yellow wax. They are, at the same time, properly antagonized. The piece now presents the appearance as shown in fig. 1. This done, a rim of softened wax is applied with sufficient force to the outer surface of the teeth and margin of the plate, to obtain a perfect impression. In this part of the operation considerable care is necessary to prevent altering the adjustment of the teeth, and when pressed with sufficient force, the edges and outer surface of the wax is trimmed and a band of thin tin, of proper width, with serrated edges is applied. The wax may now be removed without altering its relation to the teeth and plate. From the impression thus procured, as seen in fig. 2, a plaster model, as shown in fig. 3, is obtained.

FIG. 3.



An impression is made with this in sand, but the withdrawal of the model, owing to its peculiar shape, is often attended with difficulty, unless sectional moulding flasks are used. Having accomplished this, the metallic castings are easily made.

FIG. 4.

FIG. 6.

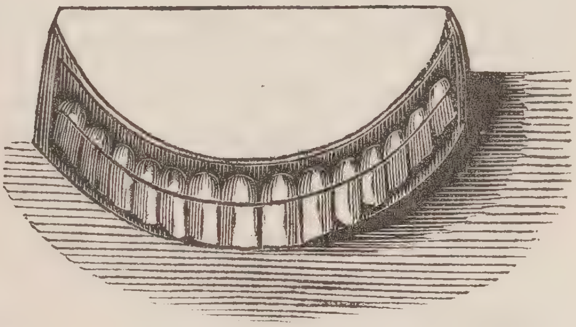
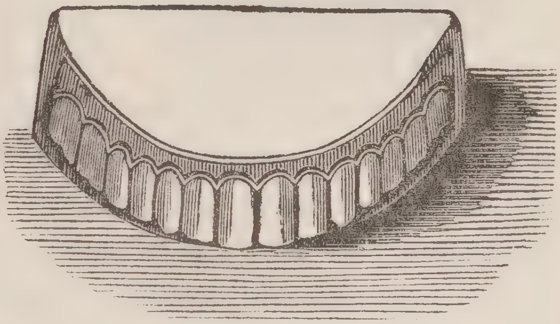


FIG. 5.

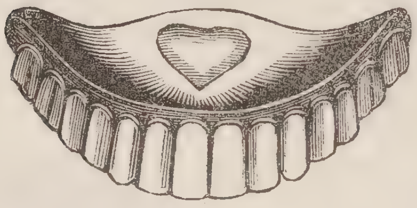
FIG. 7.



Between the castings, a thin, narrow plate is struck up, to fit around the upper part of the teeth and outer exposed margin of the base. This, separate from the teeth and plate, is represented in fig. 4, and when applied, in fig. 6. The portions of this band which embrace the outer surface of the ends of the teeth in contact with the plate, are now filed, with an oval or half round file, until this part presents a scolloped or festooned appearance, as seen in fig. 5. It is represented in fig. 7 as applied to the teeth and plate. Thus prepared and fitted, it is held in place with wax properly applied. When this has hardened, the teeth and wax to which they have hitherto been ad-

justed, are removed. A thick paste of plaster of paris is now applied for the purpose of uniting the narrow festooned strip of plate and the base. When this has hardened and become perfectly dry, the wax is removed, borax and solder applied along the point of union on the edges of the two plates, which are united by flowing the solder with heat from the flame of a lamp. The teeth are readjusted, backings put on, and the other parts of the operation gone through with in the usual way. The narrow strip passing around the ends of the teeth, resting on the base, should be long enough to pass behind the last tooth on each side, so that in soldering, it may be united to the backing. This strip serves the same purpose to single, that the outer rim does to block teeth. The principle is similar to the one recommended by the writer in the fifth edition of his "Principles and Practice of Dental Surgery," of placing a colet around the upper end of each tooth.

Fig. 8.



Teeth mounted in the manner as just described, when the work is properly executed, present a most beautiful appearance. A set for the upper jaw is represented in fig. 8. Apart from the advantages already mentioned, which they possess, over teeth put up in the usual way, the chamber or socket, into which the plate end of each tooth fits, prevents particles of food and other foreign matter from getting between the teeth and plate. There are some cases, it is true, in which it is necessary to cover the outer margin of the plate with the upper ends of the teeth, to prevent exposing it when the upper lip is raised. It would not, of course, be proper, in a mouth where this would occur, to use a socket plate.

ARTICLE XII.

Meeting of the American Society Dental Surgeons, West Point, August 2, 1853.

THE American Society of Dental Surgeons convened at West Point at 12 o'clock. President Dr. E. Parmly in the Chair, Dr. C. O. Cone, Secretary.

The minutes of the last annual meeting were read by the secretary, and approved.

The chairman of the executive committee made a report to govern the doings of this meeting of the association for this session.

The treasurer presented his report for the past year.

The society then adjourned to meet at 9 A. M. on the 3d August.

Wednesday, August 3, 9 A. M. The society was called to order agreeable to adjournment, by the president.

The treasurer's report was read, and referred to a committee. Dr. E. Townsend, Jos. H. Foster.

The committee on microscopic observations of the characteristics of saliva, and the secretions of the mouth, reported progress, and was continued. Drs. E. Townsend, J. D. White.

The committee on foreign dental literature was continued in the absence of the chairman, Dr. C. A. Harris.

On motion of Dr. E. Townsend,

Resolved, That invitation be extended to all members of the profession present at West Point, to join us in our sessions—a committee of one was appointed to carry it into effect. Dr. Jos. H. Foster.

On motion of Dr. Jos. H. Foster,

Resolved, That in consequence of the absence of Dr. S. P. Hullihen, the order of business be so far changed, that the essay of Dr. E. Townsend take the place of the opening address.

Dr. E. Townsend then addressed the society on the unprofessionality of dental patents, at the conclusion of which, the committee to revise the constitution and by-laws, reported through their chairman, Dr. J. D. White, a code of laws for their future government.

On motion of Dr. E. Townsend, the report was accepted, and the committee discharged from further duty.

On motion of Dr. Bonsall, the constitution was adopted, article by article; and after some discussion, the constitution as amended, was adopted.

The by-laws were then acted upon in a similar manner and adopted. The society then adjourned to meet at 4 o'clock, P. M.

Afternoon Session. Patrick Houston's resignation was then presented and accepted.

Dr. E. J. Dunning then drew the attention of the society to a fulsome and offensive advertisement of one of its members.

On motion of Dr. J. D. White,

Resolved, That any member of this society who shall extol his own superior merits over a fellow practitioner in the public prints, or employs means of advertisement which may be regarded by the society as lowering the dignity of the profession, or compromising its character, shall be impeached, suspended, or expelled. Adopted.

August 4th, Morning Session.—Society met agreeably to adjournment, and was called to order by the president, Dr. E. Parmly.

On motion of Dr. Chas. Bonsall, seconded by E. G. Tucker,

Resolved, That inasmuch as a pamphlet advertisement of Dr. Thomas Palmer, of Fitchburg, Mass., a member of this society, has been laid before us, which is considered highly reprehensible and derogatory to the character of the association and the profession; therefore,

Resolved, That the said Dr. Thos. Palmer be, and is hereby suspended from membership.

On the motion of Dr. Bonsall, a discussion ensued by Drs. Tucker, Dunning, Miller, J. Parmly and Townsend.

On motion of Dr. Townsend, seconded by Dr. Dunning,

Resolved, That Dr. Palmer be notified of the action of the society, and a copy of the law by which he was suspended transmitted to him.

On motion of Dr. Cone, seconded by Dr. Dunning, Dr. Foster was appointed secretary *pro tem.*

The committee appointed upon motion of Dr. Goddard made the following report, which was adopted.

On motion of Dr. E. Townsend, seconded by Dr. J. D. White,

Resolved, That the society proceed first to the election of the executive council and examining committee—adopted—and resulted as follows: Drs. E. Townsend, J. D. White, C. C. Williams, Joshua Tucker, A. C. Hawes.

On motion of Dr. E. Townsend, seconded by Dr. C. O. Cone,

Resolved, That the election of officers proceed in the manner in which they are placed in the order of business.

Dr. E. Parmly being nominated for president, declined, for urgent reasons, serving the society longer in that capacity.

Drs. E. Townsend, J. H. Foster and J. D. White were then nominated—the two latter declined serving—and on the first ballot Dr. E. Townsend was unanimously elected.

Dr. J. H. Foster, Dr. Joshua Tucker and Dr. W. H. Goddard were unanimously elected vice-presidents.

Election of corresponding and recording secretary being next in order, Dr. Cone was nominated, but peremptorily declined serving, Dr. Dunning also declined. Dr. David R. Parmly was then nominated and declined, but the society persevered in the ballot, when upon an unanimous election, he consented to serve the association for one year.

Dr. E. J. Dunning, was then elected treasurer. Dr. D. R. Parmly elected librarian.

Committee of publication, Drs. J. D. White, E. Townsend, D. R. Parmly.

Committee to take cognizance of improvements in the profession, and report at next meeting, Drs. E. G. Tucker, Jahial Parmly, J. D. White.

Dr. Jahial Parmly was appointed to deliver the opening address at the next annual meeting.

The following members were then appointed to prepare essays on some subject connected with the theory or practice of dental surgery, to be read before the next annual meeting, Drs. A. Robertson, A. C. Hawes, A. Westcott, C. C. Williams, E. G. Tucker.

On motion of Dr. W. H. Goddard, seconded by Dr. C. Bonsall,

Resolved, That when this society adjourn, it shall hold its next annual meeting at Cincinnati, Ohio, on the first Tuesday in August, 1854, at such hour and place as shall be designated by the secretary.

On motion of Dr. Dunning, seconded by Dr. Bonsall,

Resolved, That the thanks of the society be expressed to Dr. E. Townsend, for his able address read before the society yesterday, and that he be requested to furnish it to the secretary for publication. Adopted.

Afternoon Session.—The society was called to order. Dr. E. Townsend, in the chair.

The following gentlemen having been examined by the committee, and reported as worthy of membership, was unanimously elected by the society: Dr. R. P. Berry, of Newport, R. I.; Dr. J. S. Clark, D. D. S., of New Orleans, La.; Dr. Francis Field, Waltham, Mass.; Dwight Tracy, M. D., D. D. S., Willimantic, Conn.

The society then adjourned to meet first Tuesday in August, 1854, at Cincinnati, Ohio.

E. T.

REVIEW DEPARTMENT.

ARTICLE XIII.

Mikroskopische Anatomie oder Gewebelehre des Menchen, von Dr. A. Koelliker, Professor der Anatomie und Physiologie, in Wuertzburg. Leipsig, 1852. *Von den Zaehnen.* § 143 *to* § 155.

Microscopic Anatomy or Histology of Man. By Dr. A. Koelliker, Professor of Anatomy and Physiology, in Wuertzburg. Leipsig, 1852. *Upon the the Teeth.* § 143 *to* § 155. By Christopher Johnston, M. D. Member of the Medico-Chirurgical Faculty of Maryland. Member of the American Medical Society in Paris. Lecturer in the Maryland Medical Institute.

It is curious at this day to observe, that while men of most nations are eagerly seeking to abridge the toil necessarily attendant upon faithful observation, so that the most opposite opinions are maintained with warmth, and yet give but assertions as a result, the German labors unceasingly and unobtrusively, assures himself that he sees before he calls upon others to believe, weighs well his interpretation of facts, and allows himself to say "I do not know" when his experience is inadequate to enable him to wrest a coveted truth from nature. There are, to be sure, exceptional cases, but the favorable instances, we are confident, are sufficiently familiar to obviate the necessity, on our part, of adducing any other than the author, whose book is the subject of this notice.

Under the head of "organs concerned in digestion" we find the teeth, considered in their anatomical relations and intimate constitution—"the soft parts of the teeth, the alveolar periosteum, the tooth germ, and the gums" are next described—then follow a history of development, general applications and de-

ductions accompanied with historical references, and a brief summary of the nature and condition of the organs in the lower animals; the pathological relations are then shown; and the article is terminated with directions for the complete examination and study of the teeth.

"Dentine," says our author, page 56, "consists of a fundamental substance and many small tubes, *canaliculi dentium*, which course in it. The first is, in fresh teeth, even in the thinnest sections, perfectly homogeneous, without trace of composition out of cells, fibres or other elements. After the extraction of the salts of lime of the dentine it manifests on the contrary, a strong tendency to tear parallel with the tubuli into coarse fibres, from which still finer fibrils of 0.002 or 0.003 line in breadth may then be separated, which, however, immediately declare themselves as artificial products by their irregular form; and, indeed, their existence is wholly dependent upon the fact that the tubuli, lying close together, proceed parallel to each other throughout the dentine."

And again, page 60, * * "but I have not been able to convince myself of their existence as a distinct element of dentine. The cartilage of the tooth appears, indeed, to be most delicately fibrous, but this appearance, is produced in certain conditions only of the tubuli that course in it, and the rough, granulated, fibroid masses, which, however, can never be isolated in considerable length, are too far apart to present regular, constant relations."

We shall perceive, when in another place we advert to the author's modes of manipulation, that he has not arrived at the above conclusion without careful deliberation; nevertheless, Henle speaks of these "fibres" as a "fasciculus of microscopic fibrils, being analogous in color to those of the middle coat of the arteries, and in form to the external fibres of the crystalline lens. They are slightly flattened, pale, granular, rough, almost jagged, especially upon the lateral edges, by which they touch each other: their width reaches 0.0029 fr. line. * * The separation of the dental substance into fibres, is not artificial, as might be supposed—it cannot be doubted, that the formation is primitive. The history of the development of the tissue, will furnish us a decisive proof of the fact."*

* Henle, Anatomie générale—Truduction Française, Paris, 1843, p. 431.

Page 60. "Neither is there a cellular structure of the fundamental substance, as Nasmyth assumes, although, indeed, in soft tooth-cartilage, it displays here and there between the canaliculi an indistinct cross marking that reminds us somewhat of enamel."

We will presently have occasion to call up the question of "cellular structure," and, therefore, pass over it briefly for the moment. Concerning the "cross markings," we are not disposed to coincide with the author, having satisfied ourselves of the occasional existence of striæ in simple sections of the teeth of young people, and most conspicuously in carious teeth at points but little remote from the seat of disease; nevertheless, a delusive appearance of "indistinct cross markings," is sometimes presented, and depends upon the aberration of light caused by tubuli beyond the focus, which, when closely examined, (with 500 diameters,) are found to contain air bubbles, arranged in *serial lines.*—See also, Valentin, loc. cit. page 731. But thin laminæ prepared from teeth of every sort, which had been gently treated with acid, invariably displayed the cross lines so plainly as to enable us to recognize them as the boundaries of intertubular compartments. A more prolonged action of the acid, completely eradicates all trace of these divisions; until finally, there is left nothing but the "*baccated fibres*," of Nasmyth, which, in truth, are *canals* constricted at regular intervals.

The author is more fortunate in *isolating* the canaliculi, not in fragments only, but in their whole length. Schwann, Henle, Nasmyth, Müller, and Todd and Bowman, had previously succeeded in obtaining partial views of tubuli freed from the fundamental substance; and Henle, after giving their dimensions, affirms that the "walls are immeasurably thin."* And Valentin,† has also assured himself of their individuality; for he describes, as a result of his own observations, intercanalicular, cuneiform

* Henle, loc. cit.

† G. Valentin. Wagner's Handwoerterbuch der Physiologie. 1 Band, 1842, page 729.

fibrils, insoluble in acetic acid. Koelliker treats sections of teeth with muriatic or nitric acid, until the intertubular substance shall have disappeared, whereupon the tubuli, and even some of the fine ramifications, remain perfectly distinct.

He says, page 61: "The tubular structure is always manifest in the larger ones from the inner part of the dentine when the reagents have acted well, and there is plainly seen a clear cavity and a tolerably thick wall, which will often escape observation in the others, (the narrower,) and these also display the manifold bendings, and occasional thickening and thinning, which are easily explained by their softness and viscosity. Nasmyth's '*baccated fibres*,' are nothing else than these. * * * Thus much, at least, may be inferred from this observation, that the substance which immediately surrounds the canaliculi, is thicker and more resistent than the rest, and may hence, with propriety, be regarded as the proper wall."

The figure, page 62, gives, assuredly, no idea of the "*fibres*" in question.

Not a little interesting is the description we find given of what the author terms the "*interglobular spaces*" in the dentine, already mentioned by Owen* in their simplest condition as vestiges of the "dentinal cells," well described as to their outline, by Tomes,† and more recently by Hassall,‡ who found in them "a resemblance to oil globules." The author differs from Tomes as regards the contents of the spaces, and from both Tomes and Owen as concerns the molecular agency of their formation.

P. 65. The interglobular spaces "are irregular cavities of the dentine, limited by spheroidal protuberances, being never entirely absent in any tooth, and are found more particularly in the crown and in the neighborhood of the cement. In the crown they appear most frequently near the enamel, * * * and likewise further inwards; always, however, in lines which correspond to the contour-lines. * * * The projections, which have precisely the same appearance as the dentine, and

*R. Owen, Odontography, &c. London, 1840,–1845—p. 464.

†J. Tomes—a Course of Lectures on Dental Physiology and Surgery. London, 1848—p. 44.

‡A. H. Hassall—The Microscopic Anatomy of the Human Body. Amer. Ed., N. York, 1851—plate xxxvii, fig. 5.

are also perforated by canals, I term dentine spheroids. * * * The signification of the interglobular spaces and dentine-spheroids will be clearly set forth under the head of development of the teeth, but I will here remark, that their presence is normal in teeth in the course of formation, but in fully grown teeth, on the other hand, it is a defect of first formation. * * The spaces contain, during life, no fluid, but a soft substance with tubuli, exactly like the dentine, coinciding with the tooth-cartilage, and which, after long maceration in muriatic acid, is evidently more resistant than the fundamental substance of the fully calcified tooth, and consequently may be isolated precisely as the canaliculi."

Our author accounts for the transverse markings of the enamel prisms in the same manner as Tomes,* and avoids all mention of their "doubtful nature" as adduced by Todd and Bowman,† or of the "set of prismatic cells," of Carpenter,‡ which, after treatment of a tooth in acid, remain as "moulds in which the mineral substance was deposited." However, he observes, that "when the acid has acted, a viscous frame-work remains, in which, oftentimes, one *thinks* he distinctly sees a tubulus." As for the interprismatic canals of writers, which should convey a nutrient fluid from the dentine, he adds: "assuming this, is going farther than direct observation will justify;" and that, too, without denying such canals to exist. P. 103.

At page 76 we find an account of an "enamel investing membrane, * * which supplants the coronal layer of cement in the herbivora, &c., not in man alone, but also in the quadrumana and the land carnivora, and which I am constrained to regard as different from the cement," (p. 116;) and farther, (p. 110,) the identity of the "investing membrane" and the cement-layer of animals is denied on the ground that "they are chemically and morphologically different—moreover, in certain animals, the former is superadded to the latter."

P. 76. "The *enamel investing membrane*, of a thickness of 0.0004–0.0008, is intimately connected with the enamel, but

* J. Tomes, loc. cit., p. 164.

† The Physiological Anatomy and Physiology of Man: R. B. Todd and W. Bowman. (Reprint,) Philadelphia, 1850, p. 531.

‡ Principles of Human Physiology, by W. B. Carpenter, London, 1846, p. 155.

does not, however, pass over the cement. It is found in teeth at every age, unless worn away by use or otherwise destroyed, and by moistening a tooth-section with concentrated sulphuric acid is demonstrable in fragments. The pellicle separates itself more slowly in dilute acid, so that its connection with the whole tooth and its entire expansion may be examined. The membrane is a calcified, structureless expansion, * * which, mostly from adherent impurities, appears granular and of a yellowish hue, but otherwise regarded, gives no certain indication of farther composition. The only one to be perceived in it is a minute granulation, and upon the side next to the enamel a more or less indistinct representation in the form of small, polygonal facets, which oftentimes are little pits for the reception of the ends of the enamel prisms. What chiefly distinguishes this organic substratum of the envelop is *its great resistance to chemical agents*, whereby the membrane becomes an admirable protection to the crown of the tooth; it also undergoes no change by maceration in water, and is not dissolved by boiling. As little is the enamel-investing membrane affected even at a high temperature, by acetic, muriatic, sulphuric and nitric acids, only it assumes a yellowish tint in the last named. In the alkaline carbonates and in caustic ammonia it remains unaltered. Treated with caustic potassa and soda, it becomes white and somewhat flocculent, but its continuity endures."

We have thus given at length the foregoing account of a constituent of the tooth which hitherto has not received merited attention in virtue of its eminently protective character, and consequently of its practical importance. We would not, however, wish to be understood as announcing a discovery, for already Ficinius* and Klenke† had given their observations to the world, attributing to the pellicle in question a fibrous structure, which opinion Koelliker very justly rejects as erroneous.

We simply refer to the *system of canals* connecting the "granular layer" of Tomes with the cement, of which the partial observations of Tomes‡ and others had previously gained for them a knowledge of the essential§ characters—and also to the cavi-

* *Ficinius*, üeber das Ausfallen der Zaehne und das Wesen der Zahucaries—*Journal für Chirurgie* von *Walther und Ammon*, 1846.

† *Klenke*—die Verderbniss der Zaehne—Leipsig, 1850.

‡ Tomes, loc. cit. p. 47, &c.

§ Well seen in Hassell, loc. cit. plate xxxvi, fig. 7.

ties or "*spaces*" resembling those found in the enamel, which our author upon frail grounds supposes to be entirely the result of resorption. We pause, however, to cite a passage, replete with good sense, which corroborates the testimony of Valentin,* concerning the difficulties attendant upon the study of the peripheral nerve-endings:

P. 85. "With regard to the terminations (of the nerves) I would wish to express myself in favor of the looped form, yet I confess that the thing is still involved in doubt so long as the primitive fibrils of the possible loops shall not have been followed from twig to twig, the which has hitherto not been seen by any one."

But, while we admire the candor of the learned professor, we must suppose him unacquainted with the researches, &c., (posthumous) of Nasmyth, A. D, 1849, wherein the looped form of termination is distinctly affirmed, and illustrated by a drawing.

Sections 150, 151, treat of the development of the teeth, and accord with the sterling contribution of *Goodsir*, upon the same subject. Indeed, we find it frankly stated, that, although the author has examined, (in this connection,) p. 94, "human teeth only, he has not seen all that Goodsir has met with, yet has observed the most essential matters precisely as that writer has done." Again he says, (p. 93,) Goodsir "is the first who has placed the formation of the teeth in a proper light. I am thus certainly of opinion, that in all essential particulars, he has most correctly seen, nevertheless, his observations, even though almost universally accepted, have been confirmed by *no one*, if we except some slight accordances of Todd and Bowman, and Nasmyth; and they are called in question by Marcusen. (*Marcusen*, ueber die Entwickelung der Zæhne der Sæugethiere. St. Petersburg, 1850.)"

We cannot forbear noticing the error which the author has inadvertently committed, that "Goodsir's researches have not been confirmed by others," for we find Todd and Bowman† distinctly to affirm that they have in most particulars had an opportunity of verifying the excellent observations of Mr. Goodsir;

*G. Valentin, Encyclopēdie Anatomique. Nĕvrologie (Trad. Française,) p. 28. Paris, 1843.

† Todd and Bowman, loc. cit. p. 532.

and Henle* not only refers to Goodsir's detailed description of the first phases of the development of the teeth, "which prove that Arnold has correctly observed," denying at the same time, however, his description to be strictly exact—but reproduces his views at length; and if farther testimony were wanting, we might adduce the author's own statement that as *far as he has gone* he perfectly coincides with Goodsir. As for Marcusen, his investigations cannot invalidate those of the last named writer, because "they are confined to the lower mammifera; and besides avoiding all mention of the sacculi, he speaks of the dental groove as a *lusus naturæ.*"

At p. 98, we find the announcement very much at variance with our accepted views, that

"*The præformative membrane* is without any signification as to tooth-formation; and it does not deserve its name, which, however, may be permitted to it on account of its brevity;" and (p. 101) a denial of the existence of the "basement membrane" or "structureless membrane," substituting for it a substratum of the reticular areolar tissue somewhat thinner than 0.008 line, and leaving to the *membrana adamantinæ* nothing but a row of cylindrical cells, "a true cylinder epithelium." A a discussion of these points would be unprofitable, we therefore pass on to consider the author's general views of calcification and ossification.

We had wished to have seen some definite idea attached to these terms, which the present condition of physiological and chemical science would justify. It is true, that the word *transformation* (umwandlung) serves to render the generally accepted opinion; but we are made acquainted by the beautifiul researches of Robin,† Lebert‡ and Broca,§ amongst others, that the embryonic cells of *animals* occupy this relation, that all the elements of *products* result directly from their *metamorphosis*, while the elements of *constituents* are formed by *substitution* of

* Henle, loc. cit. p. 438.

† *C. Robin.* Du microscope et des Injections. Paris, 1849. Comptes rendus et Mēmoires de la Sociētē de Biologie. Paris, 1850.

‡ *H. Lebert.* Maladies Scrofuleuses et Tuberculeuses. Paris, 1849.

§ *Broca.* Rapport ā Sociētē Anatomique. Paris, 1851.

these elements in place of the original transitory embryonic cells. "It might be said," observes Robin,* "that there is transformation of cartilage into bone if in this case the cartilagine, a substance which yields chondrine, simply incrusted itself with a calcareous phosphate, so as still to furnish chondrine by boiling bones. It might be said, that there is transformation of one tissue into another, if the first should come to possess, little by little, other anatomical elements or to present another texture, preserving, nevertheless, the same immediate principles, especially the organic substances which are proper to it. But from the moment that *in the place* occupied by a tissue one discovers not only other anatomical elements disposed differently than at first, but besides these, elements formed of other immediate principles, evidently it should not be stated that there has been *metamorphosis,* but rather *substitution of anatomical elements for others,* and consequently of one tissue for another."

Our own observations would lead us to offer an additional objection to the ancient theory of ossification besides the mechanical impossibility of deposit of "calcareous salts," in "cartilage" or "blastema" without a proportionate, an obvious augmentation of volume of the recipient tissue, and this is, that in an "ossifying cartilage," the particles substituted for those of the transitory nidus, are not in the condition of "salts" but of elementary osseous molecules. Of this, Valentin† was, in part sensible, since from experiments upon bones treated with acids, and by calcination, he derives the conviction, that a great part of the earthy salts are in a state of *chemical combination* with the bone-cartilage, but adds, that an equally considerable portion of them, is mechanically contained in the lacunæ and canaliculi. These "chemical and mechanical deposits," however, appear to him insufficient to account for all the phenomena of ossification, whereupon, a new element is introduced, namely, "an organic metamorphosis in the bone-cartilage itself."

* *Robin and Verdeil.* Chemie Anatomique et Physiologique. Paris, 1853. T. 3, p. 367.

† G. Valentin—Wagner's Handwoerterbuch der Physiologie, 1 Band. p. 724.

In fine, the modes of ossification are simply two: 1, by "*substitution*," and 2, by "*invasion*," the latter differing from the former in this particular, that, as in the cranial bones, for instance, the cartilaginous tissue is occupied or "invaded" in proportion as it extends itself little by little into other tissues, while "substitution" follows the creation of the cartilaginous web at an appreciable interval. The essential nature of these two modes, is not different.

We have then in the *fœtus*, a dense *fundamental substance*, which, with its *cavities*, and their contained "*corpuscles*," or masses of organic particles that in the child are replaced by the *cells of cartilage*, constitutes the temporary cartilaginous tissue. In the *fundamental substance*, there occurs a deposit of osseous molecules, supplanting the molecules of that substance, and surrounding the *cavities*, at first opaque, but becoming afterwards more homogeneous as the "substitution" is more complete. The cavities are now encroached upon, the corpuscles or cells disappear, and the edges of the cavities lose their distinctness, to regain it, however, when the "*osteoplaste*" (lacuna, corpuscle of Purkinje) shall have reached its ultimate dimensions by encroachment, as above stated, or by spontaneous scission. If the cartilage should have been vascular, the osseous *tissue* is now already formed—if it have been otherwise, the new osseous substance is perforated by *resorption* by numerous vascular canals, and by a similar process, canaliculi proceed from the "osteoplastes," and establish a general and perfect communication throughout the bone.

Let us now apply this to the teeth. "The first traces of the cement," says Koelliker, page 110: "which, consequently, are not formed by* ossification of the tooth sacculus itself, I saw in a new born child, in the form of isolated fragments of an elongated or rounded figure, firmly engrafted upon the dentine of the yet short root, and which presented precisely the same appearance as formative osseous substance of the cranial bones. The smallest presented distinct lacunæ, * * * and upon the edges passed insensibly into a clear, cell-bearing blastema. * * * Now proportionate to the prolongation of the root such new spiculæ continually appear, and agglomerate gradually from above downwards into a single layer, upon which, then,

from without, and in the same manner, there is again applied as much as is necessary to generate the entire thickness of the cement."

Here, at least, we have no difficulty in recognizing the process of "invasion:" and if a Haversian vessel should ever penetrate into the mass, as Tomes* has figured, and as we have seen in a preparation of our own, it occurs just as in any other bony tissue. Let us now turn to the dentine with regard to the "ossification" of which our author gives us valuable information, although "its formation out of the dentinal cells, is the obscurest point of the whole osteogenesis." To carry the reader with us unfatigued, we give a schema of all the parts, as they are described in Koelliker, concerned in the production of dentine and enamel.

Tooth Sac.

Enamel organ.
- Tooth Sac.
- *Vascular Layer.*
- Spongy body—a store-house of material.
- Enamel membrane—a true epithelium.

Tooth germ.
- *Præformative Membrane.*
- Dentine membrane—a stratum of cells.
- Vascular parenchyma.
- Tooth Sac.

Tooth Sac.

The *præformative membrane*, "corresponding to one of the superficial layers of the mucous membrane," covers the papilla of the future tooth; but although entering into most intimate relation with cement and ivory, is, as has been already stated, quite unimportant in the formation of the tooth. The "vascular parenchyma" of the germ has no specific office; but the "*dentine membrane*," a "cellular expansion," particularly attracts our attention. It rests *immediately* upon the vascular pulp, and consists of "cells," like those of cylinder epithelium, which, when detached from the inner side of a thin crust or cap of newly formed dentine, "are found nearly always to possess several nuclei; and, what most surprised me, are prolonged almost constantly at their extremity, which is turned *towards* the ivory, (or from the pulp,) into a shorter or longer filament, and

* J. Tomes, loc. cit. page 59.

this appeared to be either a simple shoot, or, what was more common, as if proceeding from their interior. The diameter of these filaments was, in the middle, 0.001 line, (the diameter of the canaliculi being 0.0006 to 0.0008 line K.,) their course straight or faintly undulating; their appearance homogeneous or clearer in the interior, like dentinal tubuli treated with muriatic acid; here and there they were forked, or gave out a delicate prolongation, or finally, showed a dilatation. Upon the extremity of the cells directed *from* the ivory (towards the pulp;) such filaments appeared very rarely, but they also presented a forked division. If the tooth-shell be removed, so as to leave the cells attached to the pulp, the entire margin of the latter appears like felt, or occupied by fine hairs, which originate broader from the dentinal cells, inflect themselves variously, and much attenuated, proceed outwards."

These "*cells* are pale, finely granulated," contain nuclei, which multiply by scission, as do also the cells, occasionally, in the long direction, (p. 108,) but commonly become elongated and constricted in the middle, without, however, separating into independent parts, (p. 103.)

"As the 'ossification' progresses," continues Koelliker, "it is not inconceivable that one and the same cell may extend itself during the whole formation of the dentine, yet much rather do I believe it possible that the dentinal cells are, from time to time, replaced by others."

The preceding observations, although much at variance with those of Nasmyth and Owen, agree, as the author remarks, with the researches of Schwann upon the teeth of the hog, and have, besides, a credible air of nature. His conception of the behavior of the several elements, by and through which the process of eburnation is accomplished, although the expressions of it do not every where harmonize, strikes us as being singularly near the truth. It differs, moreover, unintentionally, no doubt, from the opinion entertained in his article "Bone," but this seems to us confirmatory of the exactness of the author's observations, and is in close correspondence with the views we have set forth in speaking of the cement. But we are impressed with the belief that the word *corpuscle* might, with propriety, be substituted for "*cell*," whereby a greater similitude would be established between the *nidus* of the growing dentine

and that of bone, and in this we think we are supported by the description of Koelliker himself.

The process of eburnation is thus summed up, (p. 107.) * * "At any rate, the fundamental substance of the dentine arises out of the cylindrical cells investing the pulp, which are more or less prolonged, blended with one another, and ossified. * * The canaliculi are derived from the nuclei of these cells, or, what is for the moment more probable, are the remains of their cell-cavities, of which the borders become more consolidated, and they consequently correspond to the lacunæ of bone. The divisions of the canaliculi may be explained by assuming that either the cells, from time to time, are separated longitudinally, which I truly believe to have seen, or that a succeeding cell should run into two preceding ones. As for the ramifications, nothing remains but a secondary process of resorbtion."

We would presume to arrange the facts thus: 1st. An amorphous substance uniting the "dentinal cells." 2d. Dentinal nucleated *corpuscles* corresponding to the *cavities* of transitory cartilage. 3d. Substitution of dentinal molecules for those of the amorphous substance, encroachment upon the corpuscles, which assume the form of filaments, and *disappearance of the nuclei* previously unchanged in form, (p. 107.) At this moment the canaliculi arise *in*, and their ramifications *between* the elongated corpuscles, just as at a later period a Haversian canal makes its appearance exceptionally in man, but normally in fishes, the rabbit or the elephant.

It is almost needless for us to remark that, as the invasion of dentine follows the ever-regenerating dentine membrane from without inwards, the pulp gradually shrinking upon itself until the crown of the tooth is completed. But the manner of the "deposit of the earthy salts" requires a moment's consideration.

P. 108. "There happens, at least in man, in the recently formed, but still slightly hardened ivory of morphological character, a deposit of earthy salts in such a manner that the whole seems to be composed of isolated spheroids. These spheroids, of which Czermak also makes mention, are seen in the first rudiments of dentine as well as in the later stages, most advantageously upon the edge of the root of one of larger teeth, regarded from without. * * * One easily assures himself that these spheroids are seated in the most external

layers of the dentine, so that the smallest are ever the most inferior and the farthest outwards, and that they are nothing else than ossified spheroidal particles of the dentine, and not bodies deposited in the interstitial spaces. Similar spheroids lie not in the lower part only of the dentine, but throughout it, in a thicker or thinner layer, in the youngest portions which border upon the germ, * * and it is easy to perceive that the canaliculi penetrate through them."

The explanation of this appearance is found at p. 105:

"As the first manifestation of dentine, the outermost border of the apex of the germ, the (præformative membrane and the extremity of the dentinal cells, inclusively,) is seen to become yellowish and more dense in a small circuit. This change strikes deeper, extends over entire cells, and these, at the same time, are farther developed, until there results a rudiment of 0.048–0.072 line, &c. While this rudimentary shell is becoming larger and thicker, canaliculi appear in the part first formed, or that turned towards the enamel, and the *substance between them* grows darker and firmer. * * *

P. 109. "If the tooth formation proceed normally, calcareous salts are afterwards deposited between the spheroids, so that the ivory becomes perfectly homogeneous and clearer; in opposite instances the spheroids remain in greater or lesser number, and preserve between them spaces which are nothing else than the before-mentioned interglobular spaces, in completely ossified dentine."

The description of the development of the enamel is very nearly in accordance with the views of most exact and original observers; and we introduce a few passages of the author simply to present to the reader a unity in the consideration of this part of the history of the tooth, premising, as the author confesses, (p. 102,) that the study of the relations of parts in enamel, under process of development, offers less difficulty than in the other dental tissues.

P. 101. "The enamel organ may be regarded as a modified mucous tissue. The enamel membrane is the epithelium, the enamel organ, with the sacculus, answers to the mucous membrane proper, wherein it is remarkable, that the vessels penetrate so little into it, * * * and the spongy tissue, of great importance in the formation of enamel, is, in my opinion, * * a storehouse of material for the growth of the enamel membrane."

The "cells" of the enamel membrane—"a true cylinder epithelium"—have about the same dimensions as the "dentinal cells," that is, from 0.012 by 0.002 line, and beneath this layer may be seen a stratum of more rounded "cells," the young, undeveloped elements of replacement.

P. 102. "The deposit of lime begins in the cells, advances outwardly (from the dentine) in them, until at last, they have become entirely enamel fibres, and goes onward, at the same time, in new cells, so that the enamel layer grows thicker and broader. Meanwhile, the enamel membrane does not disappear, * * * but must be replaced by a new formative mass. How this occurs, whether by the intrusion of new cells, or by the unceasing successive growth of the pre-existing ones, is not yet decided; only this much is certain, that the enamel fibres, at every period, constitute a *continuum*, and thus, consequently, if really different cells successively have entered into their formation, they must have coalesced with one another."

The author failed to discover the glandular tubes* of the enamel pulp or "spongy tissue," but, as seen in the Cat, supposes that they bear some resemblance to certain *plaques*, multinuclear plaques of Robin, which may have relation to cell development in the reticular spaces of the enamel organ.

The alternation of material in perfect teeth, their reparation after injury, and their pathology, are each briefly considered. For the accomplishment of the two first processes, a system of tubes, pervading the whole tooth, had been esteemed by most observers to be analogically indispensable; and, accordingly, the canaliculi of the dentine, the osteoplastes and their diverging rudicles in the cement, and the irregular lacunæ† developed between them, left no doubt of the correspondence existing between these parts; and more recent authors‡ had described interprismatic canals in the enamel, thus rendering complete this association of the constituents of the tooth. Koelliker, however, denies the normal existence of these tubuli in the enamel, believing, that when such canals make their appearance, "they have probably quite another signification from those in

* See Todd and Bowman, loc. cit., p. 534.
† See Valentin, loc. cit., p. 730—Tomes, 1 c., p. 37.
‡ Todd and Bowman, loc., p. 531, &c., &c.

the dentine, to wit, that of excavations resulting from resorbtion"—(p. 117.) On the other hand, he admits, 1st, continuations of the canaliculi of the dentine; 2d, elongated cavities, dilatations of the same; and 3d, fissures in the middle and exterior parts of the enamel, but having no connection with the above—(p. 72.) We are inclined to regard these observations as insufficient, rather than incorrect, in proof whereof we adduce the instance cited by Valentin,* of "two back teeth of the horse, in which clefts, not only of the enamel, but also of the true substance of the tooth, and most probably the result of injury, were repaired with true osseous substance, as microscopic examination established."

Koelliker, however, speaks of "the perfect tooth, as not entirely deprived of alternation of material. What the lacunæ and their canaliculi are to bone, the canaliculi of the dentine, with their ramifications, the bone cavities and tubuli of the cementum, the spaces between the enamel prisms, are to the former. All these spaces conduct fluids during life, which are derived on the one hand from the vessels of the germ, on the other from those of the alveolar periosteum, and render possible a change of substance, although it be a slow one." Page 117.

In respect to pathology, not much is said, and this little bears no mark of originality. We find *Caries* spoken of as "not a simple dissolution of the salts by the fluids of the mouth, but a putrid decomposition of the organic part of the tooth, accompanied with development of infusoria and, fungi goes hand in hand with the former." (Page 120.) We would venture to suggest that the cryptoganic plants alone are sufficient to accomplish the disintegration of enamel and dentine, for placed in the most favorable circumstances, they may surely be supposed to effect as much as when attacking rock and castle they silently but certainly reduce them to dust. Well assured are we, however, that chemical action plays its part in this "doubtful" process; and we have seen, in pathological specimens in our possession, the canaliculi near a peripheral caries filled with the "brownish precipitate," but unlike the instances cited by Tomes, the tubuli were irregular and so much dilated that they

*G. Valentin, loc. cit., p. 731.

exceeded in diameter their embouchures upon the walls of the cavity of the tooth.

The article is concluded with directions for the preparation of tooth sections adapted for microscopic observation, accompanied with indications concerning the conditions most favorable for the study of development—an addendum of great practical utility.

We cannot take leave of the author, without commending the zeal which has animated him in researches, and the honesty with which he has accorded full merit to other observers; yet, we could have wished that Art had lent its aid more effectually in the *illustrations*, since wood-cuts at best incompletely reproduce microscopic appearances.

Baltimore, May 15*th*, 1853.

SELECTED ARTICLES.

ARTICLE XIV.

Application of Artificial Teeth, by the Auroplastic Principle. By Edwin Truman, Dentist, London.

It is necessary to preface the subject of the present paper with a brief description of the means now in use for supplying the deficiencies of teeth; the ill effects of which must be apparent to all—more especially to the medical man, who knows the great part they play in the functions of mastication and enunciation. In the former, their loss subjects the stomach to double labor; not only from the food not being sufficiently comminuted, but being imperfectly insalivated thereby. In the latter func-

tion, the tongue, deprived of the wall against which it presses in the different modifications of the external opening for sound, is not able sufficiently to compress itself or lessen the cavity of the mouth whereby these modifications are produced, and so causes the pronunciation to be thick and obscure; especially in the quick changes that are necessary in singing or public speaking.

Until within the last fifty years, we may fairly say, that the construction of artificial teeth was not at all understood. I shall not, however, give any history of the past in this matter; but merely describe the present methods, in order that I may be more clearly understood when treating of my improvements.

They were originally made in a most rude and uncouth fashion; there was scarcely any attempt, in many instances, to imitate nature even in shape. Forgetful entirely of utility—the truly essential point in their construction, the desideratum of all good dentists—they seemed rather intended to fill the mouth than to aid in mastication. Previously to that period, the frames and sockets were constructed of the same material as at present, with natural or bone teeth fitted to them. These plates were either tied into the mouth with ligatures of silk or silver wire, or clasps were placed in such a manner as to clip the other teeth. I need not say how detrimental such a mode of proceeding must have been, if not performed with the greatest precision and delicacy. I have even in my time seen teeth cut through by the pressure of such bands of support. Thanks to many of the enlightened practitioners of the present day, these methods are either exploded or performed much more accurately.

There is no one method that can, as a general rule, be laid down for the construction of artificial teeth. The plan adopted must depend on the peculiarities of the case; but, with all improvements, there are defects of great magnitude still existing, both in the method of construction and in the materials employed. I shall, therefore, enumerate the different modes now in use, and show the weak points in each. The number of processes necessary to go through in constructing a set of teeth

renders it a matter of the greatest uncertainty as to its ultimate fit; besides which, the unyielding materials of which it is made are not at all calculated to produce that elastic solidity, if I may be allowed the expression, that is so essential to their comfort and utility. I do not in this include the teeth themselves, as the harder and more durable they are the better. In fact, I may say that in my following remarks I allude exclusively to the bed or sockets that come in contact with the gum. As for the teeth themselves, I prefer the mineral ones; better substitutes than which it is, I believe, impossible to obtain. Thanks to Mr. Ash and others, we have in that material a most beautiful and delicate imitation of nature, with all that transparency so characteristic of the finest productions of the human gums, without their defect of being subject to decay.

The present method of manufacturing artificial teeth is first to take a model of the mouth in wax. This is done by pressing wax of a right consistence upon the gums to be modeled; and it may, with care, be accomplished with the greatest nicety in all those cases where the outlet for the wax is larger than, or as large as, the surface to be modeled. But if the teeth overhang the gum in such a manner as to lessen the space originally existing between the crowns, or, in other words, the tooth behind the deficiency and that in front slope towards each other, as very often happens in the under jaw, then the wax cannot be withdrawn perfect. There are many other circumstances under which a good model cannot be obtained—smallness in the external opening—extreme tendency to nausea—malformation—and many other causes. In these cases the best model is obtained that it is possible to procure, and any imperfection that may exist in it allowed for to the best of the skill of the operator in the next process, which is that of producing a cast of the mouth from the wax model.

This is done by throwing plaster of paris into it, and, on removing the wax, there remains its exact counterpart, which from a good impression, is a fac-simile of the surface to be fitted. But, if circumstances have prevented the operator from procuring a perfect model in wax, then he must alter the plas-

ter until it is like the mouth. This is a most difficult operation, and one that can seldom be done well; it is the hindrance to a good fit in hundreds of cases; but it is the only alternative that is left to the dentist, and in the method or dexterity with which he performs it lies his skill.

It will be instantly seen by every body that, in this stage, certainty is lost in some degree; but we have another stage yet to go through. If the gold frame is to be used—and, on account of its durability and cleanliness, it is the material most generally adopted—the dentist is necessitated to recast it in metal, the plaster not being hard enough to work the metal plate on. Here all our difficulties occur over again, with the addition of one or two minor ones, which I do not particularly mention, as I do not in the least wish to lay claim to rectifying any defect that does not really interfere with the possibility of constructing artificial teeth comfortably and durably with our present means, and great skill in the operator. There are many practitioners of the present time quite competent to deal with any obstacles that are not insurmountable—such as are those I enumerate—by the present system.

The gold plate is afterwards struck between this metal model and a soft metal die to fit to the indentations and peculiarities of the mouth; and this can be done with great nicety by a good workman. But it is a difficult stage: first, from the contraction of the metal more or less in cooling, if the model be not cast in an alloy that is little affected by temperature, an exact fit can scarcely be hoped for. To obtain this, we are obliged to use the softer metals, as bismuth and tin: and, should these not be in the right proportions, and used for some time, the model is very apt to be injured in the process of striking, as considerable force is necessary to bring up the plate to a sharp and close fit. The model is, also, very apt to spread under the blow; and should this happen, ever so slightly, it prevents a firm fit, causing the plate to press unequally, and to rock or tilt in the mouth, thereby producing considerable pain and irritation, as it brings pressure laterally against the gum, instead of perpendicularly where the breadth of surface allows it to be borne.

The plate being thus far produced, the next process is to adapt it so in shape around the remaining teeth, that it shall hold its position during the action of the mouth. This is an operation that the dentist would willingly be able to dispense with for many reasons. First, the danger of injuring the remaining teeth; then the difficulty of so placing them that the gold shall not be visible—and often the solidity is sacrificed to effect this.

Several very ingenious methods are in use to do this without the assistance of the remaining teeth. One of these is to sink hollows in the under surface of the plate to assist adhesion by producing a vacuum; engraving, also, has been recommended: but there are few cases that succeed by either plan, especially the latter. I never found the former of any use, but Mr. Lemail tells me he has used it with great success. There have been other expedients made use of, but my space will not allow me to mention any but those most generally practiced and recommended.

The artificial teeth are then fastened to this gold plate by gold pins, attached in such a position as to allow the new teeth to occupy the position of those that are lost. This renders the case complete. If much gum have been lost, or in other words, if the subjacent structures are much absorbed, then we have, until very lately, been unable to produce a substitute for them in any material that is not very soon rendered defective by its decomposition. Ivory stained was the only thing in use. Mineral paste has been tried, but never has been brought to any degree of perfection till very lately. Mr. Ash, to whom we must at all times pay the tribute due to his improvements in almost all things used by the dentist, has produced some of his beautiful mineral teeth with a mineral gum attached, which will, in many instances, remedy the above defect to a great extent.

Before leaving this part of my subject, I would observe that several attempts have been made to line the gold plates with soft material, to relieve the gums from hard pressure. The last that has come under my notice, is Mr. Saunder's plan of using india-rubber. After moulding this substance to the inner

surface of the plate, which he had previously coated with silver, he caused it to be vulcanized: the sulphur used in this process entered into combination with the silver and formed sulphate of silver, which fixed the india-rubber to the plate. Mr. Saunders does not, however, use this plan now, as it was found that the saliva dissolved the sulphate of silver, and the caoutchouc became detached. This, however, was a step in the right path; and, by showing us what may be done, furnishes us with a good guide in our future experiments.

The next method of supplying artificial teeth is by ivory, or the tooth of the hippopotamus, &c., so carved as to fit the gum. This may be done, with care, on the plaster model, and the necessity for metal casting obviated. But its great defect is its want of durability, which causes it to be dispensed with, if possible. It is a process attended with more certainty, perhaps, than the other: but the defects of wax models are still existing. The plaster is rendered hard by resin, &c., and the ivory is carved to fit it. The teeth are then let into their proper places, and the gum is formed out of the ivory in the usual way.

The plate or bone is kept in its place by little clasps of gold wire round the remaining teeth. These cannot often be dispensed with—at any rate, at first; but, after wearing them for some time, the ivory becomes softened by the action of the saliva, and from this time, until the decay positively becomes apparent, they are the most comfortable artificial teeth now in use; but unfortunately, this is a short time, in most cases not more than twelve months, and then all our work has to be done again.

All the other plans of fitting artificial teeth now in use, are modifications of these two. The usual and best mode, in the general run of cases, is to use the gold plate for the upper jaw, and the bone for the under.

I have now to speak of the greatest defect in artificial teeth. I allude to the spiral spring used to retain the upper plate in its position, in cases where there are no teeth remaining, and the gum is so flat as to prevent their holding by suction: which

is nearly always the case; at any rate, at the commencement of their use. The two sets are connected by a spiral spring on each side the jaw, attached to the under and upper set by each end, and, by its action and tendency to preserve a straight line, keeping the sets pressed upwards and downwards. These springs have been and still are a source of very great annoyance to the wearer; for, fit them ever so nicely, they rub against the cheek—they prevent the free use of the tongue—they collect the food around them; but their greatest defect of all is the increased pressure on the under jaw, a part that is of all others the least able to bear it, especially, if the artificial work touching the gum is of the hard, unyielding material now in use. This is the reason for always using ivory in the under cases; but its non-durability and the offensive odor it is apt to give the breath when in a state of decay often tempt dentists to construct these under plates of gold, and then it is that the annoyance of the springs is felt the most, especially, if they be not fitted with the utmost nicety and success.

To show the reason why hard substances produce the ill effects they do, and to show what really is necessary in the construction of artificial teeth, I must be permitted to say a few words on the construction of the parts of the mouth that come under pressure of, or in contact with artificial teeth.

The teeth are set by nature in bony sockets fitted for their reception, formed by the alveolar processes of each jaw. These are covered by many structures of great susceptibility: first, the periosteum, with its vessels and nerves; then the gum—this is not a very sensitive structure, fortunately; but it is covered by the mucous membrane of the mouth, and its accompanying delicate structures, the vessels and nerves of touch, which, by pressure, become inflamed. On the loss of a tooth, the alveolar processes become absorbed, the socket filled up, and the soft structures adapted to cover the now unyielding and solid jaw: this process does not always proceed at the same rate or in the same equal manner. Sometimes the surface left under the gum is equal and smooth—at other times, unequal and in deep hollows; the gum and parts above are not of uniform thickness,

so that uniform pressure is very difficult to obtain—especially, as in modeling, these soft parts are only pressed between the hard bone and soft wax, whereas, afterwards, they are pressed between two hard substances necessarily unequal from the unequal thickness of the soft parts under the different circumstances. If the surface be large, then the inconvenience is not so much felt, as the pressure is distributed, and thereby lessened on each individual part.

But in the under jaw, from its form, this extended surface cannot be obtained; and here, to add to our difficulties, the absorption always leaves the upper surface of the bone more or less angular, sometimes forming quite a sharp bony ridge, with a very thin coating of gum between it and the mucous membrane, whilst, close to it, on the inner side, are the soft structures under the tongue and folds of mucous membrane, the slightest pressure on them being almost insupportable. On the outer side, we have only the mucous membrane and gum, and here, therefore, we are obliged to rear our structure; but as from the form, the plate laterally will be nearly perpendicular, and as the motion of the cheeks must be interferred with as little as possible, we have little space left. The lower surface is, therefore, at its widest part very narrow; and any extra pressure, from springs or other causes, especially mastication, presses the perpendicular edge of the plate against the soft parts, and sets up inflammation and its attendant consequences.

It appears, from the foregoing remarks, that an entirely new material should, if possible, be found for the construction of the plate, either alone, or in conjunction with those already in use, to relieve the pressure on the soft structures of the mouth; and, at the same time some method should, if possible, be adopted to procure *certainty* in the fit, combined with solidity and durability in the material. The substance used must be pure, and free from any evil or injurious effect on the structures of the mouth—it should not be hard, or rather, not much harder than the gums themselves—it should be capable of resisting the solvent properties of the saliva and acid, and should be easy of manipulation. Such a substance we possess in gutta percha, and I purpose

to show the method by which this substance may be used in the construction of artificial dentures, and be made the means of remedying the greatest defects now existing in them, from its possessing many qualities combined that are not to be so found in any other substance. I shall first point out its peculiarities; not that it is a substance now unknown or unappreciated, but because I think I shall show it to possess qualities that eminently fit it for the purpose of the dentist. It has been long in use for filling teeth, and has been used in the construction of false palates, therefore its qualities in the mouth have been well tested, even in its impure state, as until very lately the pure white gutta percha could not be obtained. This I presume to have been the reason why none of my professional brethren have yet introduced it into the manufacture of artificial teeth. I have, since its first appearance in this country, been deeply interested in it, and have tried innumerable experiments with it. It is, at present, little appreciated, compared to what it will be—and I have no hesitation in saying that a tithe of its capabilities are not known, and that it will be turned to uses, compared with which, in importance, its applications hitherto are as nothing. I will now enumerate some of its most important qualities and peculiarities, and show in what way they serve the dentist; and, in conclusion, I shall briefly detail the mode by which I intend to apply its usefulness to my art.

First, as to its purity. This must of course be our first consideration, and in considering this part of our subject, there are many points requiring attention. Is it capable of decomposition, producing an unhealthy influence? Does it become softened and offensive? These questions must be answered before we can apply it to our use. Is it a substance that can be retained in the mouth for a long time without detriment to the health of the patient, or injury to the surrounding tissues?

It is in its pure state one of the most indestructible substances known, and in cases under my own observation, has been worn for years in the mouth without in the slightest injuring either the general health of the patient, or the tissues that come in contact with it. I have used it now many years; and although

it does not wear the same in all mouths, yet in none have I found the slightest ill effects. On the contrary, the mouths of patients having gutta percha palates are so little inconvenienced by it, that after it is removed, it is impossible, upon examination, to tell that any artificial work had been there. This is not the case even with bone; and with gold worn for any length of time, a distinct mark is left upon the gum, the whole of the surface covered by the plate being a darker red than the rest. This is, perhaps, no very great defect; but I mention it as a proof of the inoffensive nature of gutta percha, in the use of which substance, it never happens. Bone worn in the mouth sooner or later decays, and in so doing, becomes black, soft and offensive, and must be replaced, the whole structure being useless. When durability therefore is a matter of consequence, gold must be employed instead; as it is in all cases more or less. No two cases fit the mouth equally comfortably and well; and nothing is more annoying, after a set of teeth have become comfortable and the mouth accustomed to them, than to find from decay that they are worn out and a new set requisite, which, like new shoes on tender feet, must be worn some time before they are easy. These defects do not exist with gutta percha; it does not decay in the mouth, and, if it did, it would not be accompanied by the same disagreeable consequences as ivory.

I have had some cases worn nearly three years, that remained the same as in the first hour they were made. Others, by the friction of the mouth and food, become slightly abraded at the edges; but never softened, never inherently offensive. When any offensive odor does exist, it is from foul breath, want of cleanliness, or from diseased stumps, which the patient has refused to have extracted, (an operation, it is not in the least necessary to undergo, when gutta percha is used.) Experience, therefore, has fully answered the question of its purity. There is, however, one more advantage: even should it wear away, it does not spoil the case, since it can be replaced at one sitting, at any time, and that without in any way altering the old comfortable artificial teeth to which the mouth has become accustomed, and this can be repeated to any extent.

Next, its *specific gravity* is very low, so that any structure composed of it, however large, is light, in comparison to what it would be, constructed either of ivory or metal. This is of great consequence to us, as the lighter our artificial teeth are, the better, providing we have sufficient strength.

This brings us to its *solidity;* and here would appear, at first sight, to lie its weak point, instead of which we have its greatest excellence. It will not alter its shape at any temperature under 100, whilst at 20 degrees higher temperature, it may be moulded to the most intricate shape, with the greatest facility. At a low temperature it is hard and unyielding, and at the usual temperature of the mouth, it is sufficiently solid to retain its shape under any extent of pressure, and yet too soft to injure the structures on which it presses. Its great elasticity, too, allows it to yield to resistance, only to return to its exact form again when the resistance is removed. It will sustain great friction with but slight effect, we may almost say, with impunity, although, at the temperature of the mouth, the fine filaments on the surface become slightly raised by friction. I shall presently show my plan for obviating this, which, in some cases, would be a defect. I think it right to mention all its defects as well as good properties, that the knowledge of them may assist my fellow-laborers in their future experiments on this substance when used in the mouth.

Its *durability*, under the circumstances in which we place it, is very great. It is soluble in scarcely any thing but strong spirits, as ether, naptha, or chloroform. It is quite insensible to the effect of acids, and the strongest alkalies have no more effect. It is quite impervious to that great solvent, water; and, although I have had it in the mouth, where heat and moisture combine under the most favorable circumstances for decomposition, for years, I have not found the least sign of decay.

Color.—If the white gutta percha be taken for the base, it can be colored to the greatest nicety of tint. But here is another defect, and, I think, its greatest; light affects it, and I do not think any color, unless brown, perhaps, will remain long uninjured, if subjected to light, as, like caoutchouc, light

8*

has power of turning it brown, the color that is seen in general use. In the mouth, this does not happen to any extent, as mostly the mouth is dark, and those parts forming the gums, I shall show, should be covered with certain substances to protect them.

Fine Texture.—This is a quality pre-eminently possessed by this substance, and one that is of the greatest consequence to us. I am told, that since its introduction, it has been used by seal engravers, to try their impressions on, in preference to sealing-wax, as it gives a finer impression. I have a piece that I moulded to the side of a shell, that has the prismatic colors transferred to it, which, I think, as great a proof as can be given of its capabilities in this respect. In use in the mouth, the impression is far more beautiful than in wax, the slightest peculiarity of texture in the mucous membrane being represented.

I shall now proceed to give a detailed account of my plan for availing ourselves of the advantages of this material. I shall follow the same plan here that I pursued in my discussion of the artificial teeth now in use; give the process of manufacture, stage by stage, until we have the complete artificial teeth. I shall then show the method of adapting them to the mouth, *after they are finished*, and how we can regain any certainty that we have lost in manufacture, and, in conclusion, say a few words in comparison of the different methods.

First, I take the best model that I can obtain in wax, in the usual way, and prepare a plaster cast from it, in which I do not attempt to rectify any defects, as that can be better done in a future process; this plaster cast I render as hard as possible, with resin and wax in equal proportions, which renders the plaster impervious to water, and enables me to immerse it in cold water with impunity.

This being completed, I construct a gold wire frame in such a manner as to support the different artificial teeth firmly in their places, and, likewise, give strength to those parts where the gutta percha is necessarily thin, as behind the front teeth in the lower jaw; this frame I firmly solder together, rendering

it alone as strong as the complete structures on the old plan; but I construct it in such a manner, that in the finished teeth it is embedded in the centre of the gutta percha, and no part of it allowed to touch either the gums or remaining teeth, its only object being to give firmness and strength, and to attach the teeth.

I then proceed to mould gutta percha around this frame, on the plaster model, in such a manner as to produce the shape required for replacing all the deficient structures of the mouth, placing the mineral teeth already prepared on the pins fixed for their reception, and moulding the gutta percha around them, so as to replace the sockets and gum originally existing around the natural teeth; this structure may then be finished to such a nicety as to represent accurately every peculiarity of surface.

Then I place the work in the mouth at a temperature just sufficiently high to enable the gutta percha to be moulded to the mouth itself, and thus it receives the shape it is to retain until quite finished.

I then remove the mineral teeth, leaving the sockets that receive them empty, and the gutta percha on all sides apparent, preparatory to my last process; this being to cover all the surfaces that come in contact with friction, either from the tongue or cheeks, with a strong plate of gold, which may be obtained by the electrotype process; being particular not to have any gold in such a position that it can possibly touch the soft parts under, in pressure, during the action of the mouth, but allowing it to dip into every socket for the mineral teeth, thereby giving them great strength. The teeth are again replaced, and fastened on the gold pins in their sockets, and all that portion of the gutta percha that represents the gum, I either color by means of pigments, or enamel the surface of the gold which has been allowed to pass over it. This completes my artifical teeth, without one destructible or defective material being used, and yet without subjecting the gums to any hard, unyielding substance.

I then immerse them in water, at about 120 or 130 degrees, which accomplishes two objects; first, removes any unpleasant

sensation from the cold metal; and secondly, enables the gutta percha to intimately adapt itself to its resting place, whilst the mouth is in action for the first few minutes, and so to receive from the mouth itself the form that it is to retain, and thus rectify any imperfection in the plaster cast or wax impression.

In conclusion, I have to compare the old system with the one I advocate. First, in the latter we rectify all uncertainty that existed in the former as to fit; next, we remove the pressure of hard substances, and equalize the pressure on the parts beneath; then we are able, from the exact fit obtained, to dispense with any fastening whatever around the remaining teeth—even in whole sets the spiral springs are not required. I have many whole sets on this principle, now in use, that are more firm without them than they have ever been with them on the old principle. The irregularities of the remaining teeth, that stood so much in our way, are of great use to us in the new system, as they tend to support and steady the artificial structure that we have been enabled to mould directly to them, without having recourse to those duplicate impressions so incompatible with certainty. In fact, we take nature's own plan in rectifying defects: the surrounding parts mould the new structures to suit themselves; whilst, in the old system, any alteration or allowance that took place after the artificial teeth were in the mouth, was affected by the new teeth on the mouth, instead of the mouth on the teeth; and I need not say which is the better.

For durability, I am sure it can compete with the old plan: and all those perplexing little accidents, so common in the best work now, will be prevented by the extra strength obtained, and the support given to the teeth by the new sockets. What I have shown will, I think, be apparent to all who wear artificial teeth, and even to those who are unaccustomed to their use. Of one thing I am confident, that none of my professional brethren will gainsay one word that I have uttered here, and that this method will be adopted in all those cases adapted to its use, which are innumerable.

I find, since writing the above, that some dentists have given an unfair report to their patients of my plan. Such a pro-

ceeding scarcely deserves comment; of all new plans, jealousies will occur: the majority, however, have given me a favorable decision; to some I have granted licenses, and done cases for others that they might test it more fully. I shall still be happy, in any way, to further their views, if practicable. Should the public ear be abused by unfavorable reports of my plan, I can only say, "See it and judge," which can at any time be done, without fee, by granting me the favor of a visit.

ARTICLE XV.

On Irregular Teeth. By C. SPENCE BATE, ESQ.

REGULARITY of the teeth has only been considered of importance worthy of special interference where it exists within reach of the eye of others, being wholly unworthy of attention if situated further back in the mouth than may be exposed by a laugh.

As far as it concerns the appearance only, no doubt this may be quite correct; but the same injurious result to the teeth must take place in an aggravated form far back in the mouth, from a crowded state of the teeth, as we perceive to exist with those in front.

But since it is a rule that, when any one of the anterior teeth is placed irregularly in the jaw, we should restore it to its normal position at the expense of one or more of the posterior, it must, of course, follow, that when these latter are the subjects of irregularity, they should themselves be removed, unless it should be found that the next to them are carious, when it should be a matter of consideration for the dentist consulted to judge how far desirable interference might be of advantage.

The teeth posterior to the canine, which are at all liable to be so affected, are the bicuspids and the second and third molars. I do not recollect an instance of irregularity of the first

molar, which tooth, being itself developed from the primary dental groove, approximates the deciduous set in character, among which history has not yet furnished us with any cases of decided irregularity.

Beyond the tendency to caries which an undue pressure of the teeth upon one another induces, there are other evils of a secondary character which are capable of being produced; for instance, a Mr. T——, who has been known to me for many years, has a second under molar, with the crown projecting into the mouth, so that the facial wall of the tooth becomes the grinding surface in ordinary mastication.

This gentleman is of a strumous constitution; and it almost invariably results, that, upon any debility of the system, the surface of the tongue brought into contact with the irregular tooth, excoriates, and forms a more or less sluggish ulcer; as yet, no greater injury has been the result; but, when I remember the sad termination of a very parallel case, which is detailed below, must confess that I believe the history of this irregular second molar has yet to be written.

Mrs. G., a lady about 55 years of age, was sent to me by my friend Dr. Nicol, she at the time suffering from a painful affection on the side of the tongue. On examination, I found it to consist of three depressions, the centre being the most important, at the bottom of which ulceration had commenced; these depressions corresponded with three teeth, they fitting each respective hollow in the tongue as if they were originally impressed by them; above these ulcers was a hard, scirrhous-like ridge, traversing the length of the tongue beyond each extremity of the ulcer, and which projected so far as to be constantly caught in the bite, to her great pain and annoyance. Upon turning attention to the teeth, which were quite sound, the second molar was observed to lean considerably into the mouth; but it was not a case of original irregularity of that tooth, but was a distortion caused by the extraction of the first molar many years before. The pressure of the posterior tooth, together with the natural absorption of the alveolar processes from the region of the first molar, had caused the second molar to fall forwards,

and to occupy the space of the removed tooth, in which position it had established itself with considerable assimilation, and required some careful observation to establish its identity.

Although the crown of the tooth occupied the position of the first molar, it—as is invariably the case under similar conditions—approximated the bicuspid somewhat more than its own fang, and thus gave to the tooth a cant forwards, and an oblique direction to the crown, causing the tooth to lean in towards the tongue, the anterior corner being most in advance of the rest of the teeth.

In order to relieve the tongue, it was thought expedient to extract the second molar, and, at a later period, all the teeth upon that side of the mouth were removed; but, unfortunately, the disease, which had been progressing for about five years, had gained upon the constitution, ulceration of the tongue progressed rapidly, and death was the result, about nine months after I made my acquaintance with it.

The history of parallel diseases of the tongue, originating in laceration from a fractured or carious tooth, can scarcely be called uncommon; but such a fatal termination, resulting from so trifling a cause as an irregular tooth, I am not aware has been previously recorded.

That such irregularity might, and probably does, exist in the mouth of many with impunity, is of course, to be supposed, and would, in all probability, have been so in this case, had not there been a tendency in the system for such predisposition; but on the other hand, it is but too probable, had not the exciting cause been present in the character of an irregular irritating tooth, the disease might have lain dormant for years, or perhaps altogether.

If we then consider the little sacrifice that it would require, is it not a duty, that, when any irritation is exhibited in the soft parts of the mouth from the presence of an irregular tooth, the tooth should be removed as early as the patient can possibly be induced to part with it?

But it is the third molar, or dens-sapiens of the posterior teeth, which is the most liable to malposition, sometimes grow-

ing into the cheek, and inducing considerable ulceration of the soft parts. I have a cast of the upper jaw, in which the dens-sapiens must have been developed in the same alveolus as the second molar, or immediately beneath it, so that, when the former had progressed so as to make its way through the gums, it pushed the second molar out of the way external to the arch, the third molar occupying its place in immediate contact with the first; a case more extraordinary still was published by Mr. Tomes, in the *Medical Gazette*, where the third molar occupied an inverted position in the jaw, immediately below and interlacing its fangs with those of the second molar.

Perhaps of all the evils which result from irregularity in the teeth, none are so painful and serious in their results as that which is possible to ensue from the abnormal position of the third molar, and which, from some cause, probably dependent upon our artificial habits, is far more frequently irregularly planted in the jaw among civilized tribes than otherwise; and often when perfectly in a line with the rest, they impinge so tightly against their neighbor as to be the source of pain, not unfrequently amounting to acute neuralgia.

This I believe to be the true source of a mysterious toothache, liable to be confounded with neuralgia, but which the best writers on dental surgery are either silent about or candidly confess their inability to fathom, owing to the conception of the existence of pain being seated far from the origin.

Having myself been a sufferer, cannot do better than relate my own case; the more so, since it was the first to draw my attention to the origin of what has hitherto been a mystery; the only treatment supposed to be of any use was the loss of a sound and valuable tooth.

For two days and nights was the subject, some ten years since, of a severe gnawing, persistent pain, situated in the first molar tooth, on the left side of the inferior maxilla. The tooth had been filled, but at so early a period that the disease could not have proceeded so far as to affect its internal organization. The remainder of the teeth in the mouth were likewise healthy. Upon making a more thorough examination, the third molar

was perceived to be making its way through the gum, producing much irritation in its immediate locality; slightly touching it with a probe, produced severe pain for some time. I requested a medical friend to apply the lancet to the part, which he did freely, the application of which induced considerable pain, which was more consciously felt about the temple and ear than in the immediate locality of the tooth itself.

Next morning, the edges of the incision, made by the lancet, appeared to be sloughing, and the inflammation about the tooth much on the increase. The lancet was again used, and passed quite round the tooth, so as to insure its being freely liberated from the integuments, which, in the region of this tooth, are generally tough and in quantity. Not being content with this, my friend passed the lancet along the gum on each side of the teeth, as far as the first molar, in which, originally, the pain was felt. Likewise, took an aperient draught. Within a short time, the edges of these last incisions exhibited signs of undergoing the process of disorganization. In the evening, leeches were applied to the part affected, and I took a sleeping draught, fearing lest, as the night before, I might be kept awake.

In the application of the leech, I was surprised to find that I was not conscious of perceiving the bite of the animal, and it was not for some minutes, that I was aware, that one had preferred the side of my tongue as a more desirable spot for a repast, than the inflammatory surface round the molar tooth.

The morning after their application, the bites on the gums, but not the tongue, were marked by similar white edges of dead tissue, as appeared along the incisions made by the lancet; also, a considerable way along the internal surface of the cheek, which, being swelled from the extension of the irritation, having been slightly excoriated from the friction induced by its coming in contact with the teeth, was exhibiting unhealthy symptoms. In fact, an inflammatory sloughing ulcer was spreading fast, and looking very angry. The tongue became dry and furred, the breath offensive, the pulse beat feverishly, and I felt generally ill. The aperient was repeated, and used a gargle of potassæ nitras, and seriously entertained thoughts

of removing the original exciting cause; but it was considered, both by my friendly attendant and myself, that the removal of the third molar at this period could not avail any thing beyond copious blood-letting; for we felt secure in the opinion, that the present disturbance had had its primary cause removed by the free use of the lancet. (Such was the opinion then.) Another day passed, and no benefit appeared to have been derived from the present treatment. In fact, the wound had spread, passing now down the internal wall of the lower jaw, forward, to the second bicuspid tooth; along the external gum, to an equal extent; along the cheek to the angle of the mouth,—passing along the external gum of the superior jaw, and proceeding, internally, upon the posterior palate.

The local application was now changed, by my friend's desire, for a solution of the chloride of soda, while two tablespoonfuls of aperient mixture were taken every two hours.

Next morning, the good effect of this treatment was perceptible, in the evident arrest of the ulcer, and the freedom from pain, which had almost ceased, within two hours after the use of the present gargle. After a day or two the ulcer assumed a sluggish appearance, but which readily healed under the influence of a solution of alum.

At the time, I attributed the full extent of the disarrangement to the delay in the use of the lancet, owing to the seat of pain directing our attention to a spot, somewhat remote from the cause; but the subsequent history of this case, together with observation upon parallel cases for many years, have convinced me, that the cause of pain was the great pressure upon the teeth, by the protrusion through the gums of this new molar.

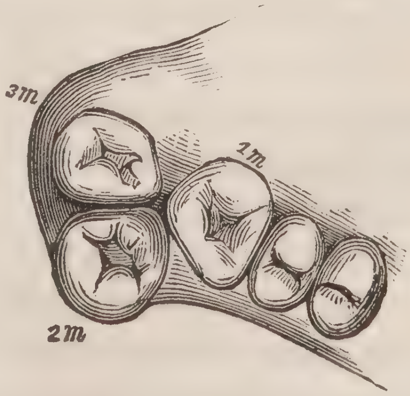
I say the subsequent history, insomuch that a return of pain was experienced, with every disarrangement of the general system, for some time after the tooth was fully developed, and was finally removed by the passing of a file between it and the first bicuspid, which was done in order to make certain that caries did not exist in a position invisible to the eye. On the application of the file, perfect relief instantly followed.

I shortly afterwards had a better case, in order to test this important fact in the treatment of the teeth. It was a young lady, whose third molar was protruding through the gum. I first tried every recognized treatment, such as lancing the gum, etc., taking care that no flaps of the incised gums should remain, which might again unite above the tooth; but for a long time no advantage beyond temporary relief was obtained. I then passed a dividing file between it and the second molar, the result was partial relief, long before the operation was complete, and perfect freedom from all pain as soon as the file had completely separated this tooth from the next. About a fortnight afterwards, she returned to me, suffering, perhaps, quite as much as previously, she believing the pain to exist between the second and first molar.

Upon looking into the mouth, I found that every trace of the application of the previous filing was obliterated by the third molar being in perfect contact with the approximal surface of the second.

I again repeated the operation of filing; but, not contenting myself with passing it between the second and third, I also cut down between the first sound molar; since which period, about seven years have passed; I have seen her frequently, and she has complained of neither pain nor ache, all the teeth being free from caries.

But the most self-evident case of the immense power which the third molar possesses, by lateral compression of others in the same jaw, was exhibited in the mouth of a lad, in which, in order to complele its own development, the third had thrust the second molar right out of its line of growth, itself occupying the normal position of the latter, as represented in the cut.



This case was brought under my notice, in consequence of severe pain; the second molar, from its position, being useless,

was removed, which afforded instantaneous relief. All the teeth were free from disease.

But the most important case of the kind which has been brought under my observation, was that to which the following history refers:

When Miss B. first called on me, I found the two central and the left lateral teeth so denuded of the gums, from the unhealthy absorption of the alveolar processes, that they were so loose as to be scarcely able to retain their places; the wound which surrounded the loose teeth was connected with an ulcer, near the base of the frenum labii, which, upon probing, I found to be connected by a sinus with another ulcerative opening near the mesial line, a little anterior to the suture which unites the palatal process of the maxillary with the palate-bones, and both with another which debouched into the nasal passage.

At this time the ulcer in the mouth, which, from its position, was the most important, was by no means large, but still admitted of small fragments of necrosed bone to come away through it, as also, not unfrequently, was the case by the one first named, that is, at the base of the superior incisor teeth, and from all of which constantly oozed fetid pus. Round the edges of the wound, the color of the ring which marked the boundary of the inflammatory action, was of a purple hue, more particularly so around the palatal ulcer, which, together with the rest, appeared to be of a sluggish character.

All the loose teeth were looked upon as sources of irritation, and removed; and, in accordance with the opinion of her medical attendant, the cure was left to the strength of her constitution, assisted by a tonic treatment, air, exercise, strengthening diet, and medicine.

The history of the case, as related by the patient, who then was unmarried, and about twenty-two years of age, was, that she suffered from cutting her wisdom tooth on the left side upper, during this period, or shortly after, she became conscious of a swelling in the roof of the mouth, but which gave her neither pain nor inconvenience; consequently, it passed unattended to for some time; but, ultimately, finding that it did not improve,

she was induced to consult a druggist, who applied some preparation of iodine* locally, and gave her medicine to take.

It was about twelve months after the commencement of the disease, that it was brought under my notice, from which time, for four or five years, pieces of bone came away at intervals, but, ultimately, the disease appeared to be arrested, leaving, as the result, a communication between the nose and mouth about the size of a fourpenny piece, to the great detriment of her powers of speech, except for the application of artificial assistance.

The ulcer in the front of the mouth had almost, though not quite, healed. When I last saw her, no more teeth becoming involved in the waste of their osseous support, although the left canine is denuded of all support to near the extremity of the fang upon that side which is next the ulcerated portion.

The analogy of this case with others that I have met with in practice, would seem to suggest a similarity of cause; viz. palatal abscess from a carious tooth; but in this case, there was no carious tooth to which the disease could be referred, the wisdom tooth being itself perfect, and in her head up, I believe, to the present time; and since her social position is such as must preclude a doubt to cross the mind of its arising from any illegitimate source, I am induced to believe, that the palatal swelling was produced by the irritation caused by the pressure of the third molar upon those teeth which had been previously developed.

It may be a matter for consideration, whether (I was going to add, in all cases) the third molar had not better be removed from the mouth, the other teeth being perfect; its value as a masticating organ is nil, and its pressure tends to keep the others in such close approximation with one another, that caries in the interstices of many must result, unless it be precluded by surgical assistance, or the early removal of this last developed tooth; particularly, this should be taken into consideration when its preservation entails the application of the file upon

*The topical application by iodine, is conjectural from her description of the material, and from conversation with the druggist employed.

(as in a case previously mentioned) other than the tooth itself; that is, how far the injury done by the application of the file between the first and second molar was compensated by the cure and exoneration from the pain of extracting the third molar.

I am much inclined to think, that the kindest plan is the early removal of the tooth; yet, I confess, that it is pleasant to our humanity to be able to afford relief, as was the case but a few days previously to this being written. A young girl, about twenty years of age, called upon me in apparently the most excruciating agony: every tooth, upon the closest examination, was found to be typically perfect. The pain to her feelings existed between the second biscuspid, and the first molar on the right side upper. Observing this, I passed a dividing file up between them, carrying a safe side towards the molar; that is, cutting most from that tooth, which, in the history of the teeth, is shown to be least valuable. The operation was described as pleasant, and the cure resulted immediately upon the completion of the perfect separation. No return of pain has taken place.*

I could detail cases of this kind in great numbers, since, for the last eight years, it has been somewhat a favorite plan of treatment; but to do so would be merely a repetition of parallel data with similar results.

I am aware, that it should be a golden rule with the dentist, that a file or instrument that has the power to wound, should not be brought into contact with a healthy tooth; but in cases such as these, severe pain liberates an operator from the trammels of general laws in practice; and the difference between an able practitioner in every department of surgery, and any other, exists in the capability of knowing when general rules are applicable, or when and how they confine the powers to cure.

* It is not only in such cases that I find filing important, but also in carious teeth. Where pain is occasioned by contact with the other jaw, the pain is almost certain of being removed by isolating the diseased tooth from its neighbors.

The surgical experience of those most esteemed in dental practice confesses to the fact, that many a healthy tooth has been removed, the operation being the result of intense pain, and no sign of disease either before or after the removal of the tooth has been at all discoverable. Again, similar cases in which an attempt has been persisted in for some time to retain the tooth, even at the expense of considerable pain, the hope being that resolution of the inflammatory action may take place, and the disease subside of itself; but, unfortunately, the overlooked cause still persisting, the local irritation has passed into a systemic one; and, instead of resolution, suppuration of the irritated pulp of the healthy tooth has resulted from the treatment.

Presuming, upon the experience of many years, that if a severe pain exists in a tooth,—say the biscuspids, molars, incisors, or, as I have more frequently found to be the case, described as being between two,—and, upon careful investigation, no caries can be detected in any of the teeth upon that side of the mouth in either jaw which may lead to the conviction, that the pain experienced was sympathetic from such caries, experience and careful observation have convinced me, that the pain felt originates from an undue pressure of the teeth against each other, the exciting cause being most commonly due to the progressive development of the third molar, not so much at the time of its protrusion through the soft tissues as when it has so far advanced in its development, as to bring the broadest diameter of the crown on a level with that of the teeth situated anteriorily to it. If the third molar be distorted in its position, or is such in growth, that there can be little hopes of its becoming an efficient organ,—the duties of which, if it does not fulfil,—its presence must prove worse than useless, and, therefore, it should be removed. But, as not unfrequently happens, the patient's fears, aided by the consciousness of the distant seat of pain, frustrate the surgeon's judgment, it is then that I would urge its pressure against the next being removed by a file being passed between it and the second molar, and this part of the operation to be performed previously to that of a file being

passed between those teeth which occupy the seat of pain; and not unfrequently it will be found to preclude the necessity for the latter being done, and, if so, the most valuable teeth are preserved uninjured.

Another test by which the truthfulness of the existence of abnormal pressure may be diagnosed, is to be found in the increased pain being given, or its reproduction from cessation caused, by the introduction of a thin wedge-shaped instrument between either the teeth affected, or between the second and third molar. This instrument increases the pressure, and, therefore, increases the pain; and the true origin of the disease is palpably manifest.

Generally, the operation of the file in such cases, is described as far from producing so disagreeable a sensation as, under ordinary circumstances, and the completion of the operation is always instant relief. Sometimes, if the enamel be thin, or the approximal surfaces lie very parallel to each other, so that the file would have to cut its whole way to the gums coming into contact with the dentine and peridental membrane at the extremity of the enamel, or from some other cause the tooth be exceedingly sensitive; the operation, which would otherwise be very tedious and painful, may be greatly relieved by the local application of either chloroform, or strongly saturated solution of camphor in rectified spirits of wine.

Of course, here, as in all long operations with the file, the frequent application of cold water, by precluding the file and tooth from becoming hot by friction, renders the operation safer and more pleasant to both the operator and patient.

ARTICLE XVI.

Memoirs of a few Fundamental Points of Dental Medicine, considered in its Application to Hygiene and Therapeutics. By A. F. TALMA, M. D., Dentist to the King of Belgium, &c. &c. &c. Translated by C. A. DU BOUCHET, M. D., D. D. S. First Series. Brussels, 1852.

THE permeability of the teeth and the persistence in their tissues of a circulation, doubtless feeble and obscure, are facts which physiological observations and direct experiments positively establish beyond a doubt. These observations and experiments strengthen the inductions deduced from the examination of their anatomical structure. M. Muller has seen ink rising by capillary attraction in the tubuli of the teeth of the horse. M. Serres has observed, in several preparations, blood globules choking up the canaliculæ of the dental cavity and forming three distinct striæ. Contrarily to the experiments of Hunter, on the nutrition of young animals, M. Flourens has demonstrated that by the use of madder, it is not only that portion of the teeth, the formation of which takes place while the animals are subjected to this treatment, which acquires the peculiar hue, but likewise the parts of the organ previously existing. In some cases the teeth, even their enamel, assume a manifest sanguineous tint, and receive a coloration which can be due only to the repletion of their vessels. It is perfectly recollected that during the cholera epidemic in 1832, several surgeons, and among others M. Begin, have presented to the Royal Academy of Medicine of Paris, teeth which, as well as the other parts of the skeleton, presented a cyanosed tint analogous to that of the skin. The same observation has been made again, during the last epidemic of 1849.

After recalling the opinion of Beclard, who, although not willing to acknowledge any vascular communication between the dental pulp and the ivory of the crown, still admitted that this

latter substance is continually receiving from the pulp a fluid by imbibition. Messrs. Desirabode leave this part of the question undecided. As to the ivory of the roots, do they add: we think that its texture, the organic action and the morbid alterations developing themselves in the roots, although not making evident, vessels continuous with those of the general organism, authorize at least to consider the question as settled in favor of their presence. But upon what principles, derived either from the evolution or structure of the teeth could the learned authors we have just quoted, establish such a distinction between the ivory of the root and that of the crown? No line of demarkation between the two parts is found to justify such an opinion, and that which is applicable to the one must also be applicable to the other.

It has been impossible for me to allow the interesting labors of so many observers to be published, without endeavoring to ascertain their correctness. A long time previous, besides, I had been led, by the alterations of dental tissues, to conclusions analogous to such anatomical examinations and physiological principles have permitted us to arrive at, and certainly this very circumstance of similar results in pursuing such dissimilar roads, is highly gratifying.

With the assistance of a good magnifying glass, it is easy to see on the surface of the eroded portion of a carious tooth a cellulo-vascular layer, reddish, brown or black, granulated irregular, and exhibiting the appearance of the fungous flesh of certain ulcers of bad character. If, after having made a section perpendicularly to the ulcerated surface, we examine the plan of the section, it is easy to perceive in the invaded portions, alterations entirely vital; upon the points nearest to the ulcer, the enamel or the bony structure are softened, friable, of a brown or black color; as it dips into the substance of the tooth, the tint becomes less deep, and is, finally, through gradual shades of a more or less yellow cast, lost into the normal color. Upon this morbid field, more or less extensive, the eye, aided by the magnifying glass, distinguishes lineaments, striæ, which demonstrate the presence of canaliculæ, or of vessels much enlarged. It seems that in the teeth as in the caries of bones, especially in

the denser portion of the latter organs, the increased vascularity precedes the softening and prepares for the destruction of the tissues, whose solid molecules are disintegrated or absorbed by the living fabric.

These phenomena become more apparent still, most incontestable, when we cut the dental substance, starting from the carious portion into lamellæ thin enough to render them very transparent, and permit us to examine them in holding them up to the light. Then the graduation of the tints, the diminution of the proportions of the solid or saline portion of the organ, the preponderance on the contrary of the cellular, tubulated or vascular portion become facts of a palpable evidence.

I could easily multiply these examples, in going over the series of the affections of a vital origin, such as exostosis, erosion, the softening of the dental substance, but they will come in better order when I have occasion to treat of those diseases especially.

If I have so strenuously insisted upon the anatomical, physiological, and pathological facts, demonstrating the vitality of the teeth, it is because this point is of an importance of the first order. This vitality is, in fact, the key to all dental medicine; it *alone* can connect it with general medicine, by links which reason and experience do not disapprove of. Let this vitality be considered as not existing, and the art of the dentist is no longer but a mechanical affair, more or less ingenious, more or less complicated, which will no doubt require a special dexterity, but which will no longer have but a distant relation to medicine. Let, on the contrary, this vitality be demonstrated, a light suddenly illuminates the hygiene, the pathology and therapeutics of the dental apparatus, and they immediately rest upon rational and scientific bases, from which they cannot be removed.

If the teeth were in organic bodies, as has been advanced by eminent men, (rather naturalists than physicians,) how could we connect their organization and diseases with the general constitution of individuals? How could we account for the influence exerted over them by atmospheric variations, and the thousand circumstances of regimen and morbid causes in the midst of

which we live? Once developed, would not the teeth, according to that hypothesis, be exclusively submitted alike those of our artificial sets, merely to those mechanical or chemical causes of destruction capable of wearing out or breaking them, or decomposing their substance? By what rules, drawn from physiology and pathology, would it be possible to prescribe those means of treatment with the aid of which we however succeed in modifying, preserving, and even sometimes restoring to their normal condition, organs which but for that vitality would only be in the mouth of patients, carved ivory or fragments of porcelain? It is by starting from this fundamental principle of the vitality of the teeth, throughout the entire period of their duration, that we are able to distinguish, amid so many means proposed for the cure of their diseases, those which are really useful from the others, the use of which might be injurious, and even often dangerous.

II.—*General Importance of the Care and Attention bestowed on the Teeth.*—It is much to be wished that, in certain countries, where the diseases of the teeth are unfortunately so widely spread and so often assume the worst type, each one should feel the necessity for rational and constant attention, as well as the opportune assistance of the man of the art to watch, and, if needed, direct the labors of nature in young subjects, until the epoch of the entire consolidation of the dental apparatus.

As I have already stated in one of my previous publications, the medicine applied to the study and treatment of the affections of the mouth and teeth, reposes upon the same principles as general medicine. The latter gives to every one advice based upon experience, to preserve health; but when illness comes, when important organs begin to suffer, the assistance of a skilful physician becomes necessary. It is even prudent, as has been laid down by sound writers, to speak from time to time about one's health and ask for advice, especially at those critical epochs of the organism when the body undergoes certain modifications, more or less intense, which dispose to disturbances of functions and disease. How many families have lost the objects of their fondest hopes, only by their too late recourse to medi-

cal advice? How many others are indebted for the happiness of still preserving their offspring, to the careful solicitude with which they have constantly surrounded them.

These reflections are in every respect applicable to the diseases of the mouth. The profession may express and diffuse, for the preservation of this important part of the economy, general principles easy to be followed and of incontestable utility; but when, notwithstanding the observance of these precepts, or in consequence of paying no regard to them, diseases develop themselves, the physician alone can discover those diseases in their origin and oppose to them appropriate means, before they have determined unretrievable alterations. The dentist alone can, during the labor of the eruption and arrangement of the teeth, prevent the disagreeable or hurtful arrangements which these organs are liable to assume, or remedy it at the outset, and correct anomalies which, at a later period, could no longer be corrected.

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These are truths of universal application, which I have always deemed a duty to inculcate in the minds and customs, in the place of the careless barbarity, or the absurd prejudices too generally met with among communities.

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Childhood, old age, trades, professions, the organs of locomotion, respiration, and other more important functions, are the object of rules and precepts which enlightened persons study and observe. Why, then, should the mouth be neglected? Why, during youth, and even during life, should we not entertain the same anxiety concerning the dental apparatus, as we do for other parts less exposed to the sight, and often less important to health.

III.—*Cares Relative to the First Dentition.*—As early as the first age in life, the mouth, and particularly the dental system, need special attention. If a few physicians have exaggerated the dangers attached to the labors of the first dentition, it is to be feared that others, considering this labor as foreign in the greater number of cases, to the diseases of children, should fall

in the opposite exaggeration far more dangerous, inasmuch as it tends to cause to neglect useful precautions, and lead away from the research of important phenomena. Whether dentition be the primitive cause, or only the predisposing cause of the diseases developed, pending its entire duration—whether it be their termination, or complicate and accompany them only, it cannot, in either case, ever be considered as an indifferent circumstance, and we must make full allowance for the share of action it may exert over the progress and intensity of accidents. Universal opinion is in harmony with this precept, and the greater mortality among children at this time of life than at any other period, renders it imperative not to neglect it.

It is not my purpose to expatiate at length upon the multifarious affections which may result from the various sympathetic reactions of the dental system, set in action upon the cutaneous, respiratory, digestive apparatus, and especially the nervous system. These developments appertain to general medicine.

It will be sufficient for me to say, that, from the third month to the middle of the third year, a period, the commencement of which corresponds with the first efforts of the eruption of the incisors, and which terminates by the appearance of the second molars; that, during that period, do I say, every time an affection of some importance shall arise spontaneously in the child, with phenomena ever so little insidious, the first care shall be to ascertain the progress of the dentition, to examine the mouth, and take due notice of the condition of the alveolar ridges. It must be borne in mind, that the eruption of the teeth is the more difficult, the more susceptible to be accompanied with grave accidents, the larger the teeth are endeavoring to force their way out; little felt when incisors are in question, but much aggravated and painful when canines and molars. We must also remember, that the eruption of several teeth at the same time, is liable to cause more intense reactions.

Whether the examination of the mouth displays in the heat of that cavity, the abundance of saliva, the tumefaction, the redness, the softening of some points of the gums, the traces of a painful labor to which may be traced the morbid phenomena

just enumerated; whether the complete inertia and the normal condition of the buccal tissues remove any idea of that kind, in both cases, the practitioner will have done much for the etiology as well as the diagnosis and treatment of the disease he intends to contend with.

When the cause of the disturbance seems to lay in the difficult eruption of the teeth, or when this circumstance adds itself to the accidents and aggravates them, we should remedy it. Mild gargles, soft bodies, wet with slightly sweetened mucilage, will be held to the mouth, or given to the child usually fond of biting. If the gums are much swollen, of a deep or lividinous red; if the fever, heat, and restlessness are considerable; if the little patient is plethoric, one or two leeches will be applied with much advantage to the angle of the jaws, and revulsives in the meanwhile applied to the feet. A few slight punctures, made with the point of a lancet on the gums, will have a tendency to deplete them more directly. If aphthæ are present, they should be washed with a mucilaginous decoction sweetened with honey, and suitably dosed with hydrochloric acid.

These means usually suffice, if not to restore quiet, at least to allay local accidents, and enable nature to finish her task. In more grave cases, and particularly when nervous phenomena of somnolence or convulsion place the life of the patient in jeopardy, it may become necessary to perform a more serious operation. I mean the incision of the gum over the teeth, the eruption of which is too tardy, or meets in the density of the covering tissues an unusual difficulty. This operation should never be performed inconsiderably. Although trifling, it frightens the parents, causes pain, may expose, if the hand of the operator is not steady, to wound some part of the mouth, and, finally, does not seem to have at all times been practiced without inconvenience, either for the gums, which have sometimes suppurated, or for the teeth, the premature decay of which has been attributed to lancing.

Before having recourse to it, it is necessary on one part, that serious morbid accidents should demand it, and require that the effort of eruption, the origin or aggravating complication of

these accidents, be facilitated or shortened. On the other part, it is equally necessary that the tumefaction, redness, pain in the gums, should announce that the local labor has already made considerable progress, and that the tooth seems ready to appear. When these two conditions are met with, the incision of the gum acts as a complete sedative, accompanied with local depletion, which procures at once the relaxation and disengorgement of the tissues. * * * *

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A very important observation must be added to the preceding. Far more frequently than practitioners are willing to admit it, the accidents attributed specially to first dentition, are the result of the preparatory labor of the second dentition; hidden, deep labor, displayed by anatomical inspection, shaking the whole maxillary apparatus. The development of the crowns of the permanent teeth, coincides, in fact, for the greater part, with the successive eruption of the deciduous teeth. If, as happens with certain subjects, the second teeth are larger than allowable by the condition of the jaws, they will exert upon the latter a considerable pressure, will determine the distension of the cavities enclosing them, and the dull irritation of all the surrounding organic elements. This fact is produced particularly when the first teeth are small, whilst the permanent ones are preparing on a much larger scale. * * *
It will be seen, that it becomes very difficult to distinguish in complicated morbid disturbances, what may belong to each of these two orders of disturbances, whose action is sometimes isolated and sometimes united. When the eruption of deciduous teeth is the only cause of disturbance, the incision of the gum is usually efficacious; without proving hurtful, it remains insufficient in the cases in which the development of the permanent teeth is the cause of the accidents.

I have remarked, that when the permanent teeth are in bearing with the jaws, and meet with no obstacle in their growth, the deciduous teeth usually appear without any difficulty, inducing no bad symptoms, and often unnoticed, unless the child be of a very susceptible diathesis.

These circumstances perfectly explain the different opinions of many physicians and dentists, relatively to an operation, in itself deprived of danger, but whose success depends upon fugitive conditions, requiring much experience and skill to be properly appreciated. I must repeat, that in cases of grave accidents, of which dentition may be the origin or complication, in order to derive from the incision of the gums all the benefits we should expect, it is necessary, that the gum over the tooth or teeth in process of eruption, be raised, reddened, tumefied, hot, tender to the touch. In this condition, the tooth is near and ripe, as Duges correctly expresses. If the gum is softened, stretched, and exhibits a white spot, a sort of pellicle, this appearance indicates that it is almost completely absorbed or worn off, and that under that pellicle exists a projecting portion of the dental crown.

In other words, it is necessary that the labor should be *localised*; that one or several teeth be very distinctly prominent, that the gum be particularly inflamed, and raised upon the elevated points; if, on the contrary, the gums are vaguely tumefied and inflamed, especially at their base, we must infer that this condition of things depends upon deep-seated disturbances, cause by the development of the permanent teeth, and that incisions would prove useless.

Finally, it sometimes happens, that the gum is pierced upon a point, and the tooth makes its appearance, but having reached this degree, especially as regards molar teeth, the labor becomes stationary, and requires to be terminated by the intervention of the art. This indication presents itself in many subjects when cutting their dens sapientiæ. The operation itself is one of the simplest. The instrument should be guided with precision, by the fore-finger of the left hand; the nail marks the place where the incision should be made, and limits its extent. The simple section, parallel to the alveolar ridge, is only adapted to incisors. Canines and molars require a crucial incision, and even, if possible, the angles should be raised with the instrument.

After the operation, the flow of blood, always useful in such cases, should be promoted by means of gargles with lukewarm mucilaginous water, and it is proper to continue the use of the means of treatment previously employed. The improvement is, in many cases, almost instantaneous, and the most formidable accidents have been known to disappear in a few hours as if by enchantment.

I must here recall that accidents determined by dentition, or complicating it, are the more frequent and the more grave, as the subjects are the more weakly, irritable, unhealthy; badly ventilated dwellings, uncleanliness, bad food, improperly directed artificial lactation, manifestly predispose to them. We must then, as far as possible, in order to prevent them, surround children with well-directed hygienic cares, among which, living in the open air, suitable clothing, frequent tepid baths, cutaneous frictions with flannel, and especially proper alimentation hold the first rank.

IV.—*Cares relating to the Second Dentition.*—§ 1. *Normal Phenomena.*—In the preceding article, I have noticed that the development of the crowns of the permanent teeth, coincides, in a great part, with the successive eruption of the temporary or milk teeth. Lodged in distinct cavities, beneath and back of the first teeth, the permanent ones enlarge the bony cells which contain them, destroys the partitions which separate them from the primitive corresponding teeth, act upon the roots of the latter, wear them out, shake them, and contribute to determine their fall.

There can be no doubt, that this admirable phenomena of the removal of the deciduous teeth is as vital as mechanical. These teeth become loose, detached and fall, in conseqnence of the same law which separates the fruit from the tree. Even if the tooth of replacement should not exist, or deviating in its situation, it should not touch the root of the one it is corresponding to, the result would be the same, excepting as to time. The obliteration of their nutritious vessels, the atrophy of their means of union with the alveolar walls, the loss of life, in a word, within or without, is, in fact, sufficient to isolate milk teeth, render them foreign to antagonism and hasten their fall.

The replacement of these teeth takes place nearly in the same order as their primitive eruption. The first dentition being completed from six to seven years, by the eruption of the four first large or permanent molars; the second begins with the lower central incisors, which are shed from seven to eight years. A short time after, the superior central incisors appear; then from eight to nine years, the lateral incisors, still commencing by the lower jaw; from nine to ten years, the four first small molars or bicuspids; from ten to twelve, the canines and the second bicuspids; from twelve to fourteen, the second large molars, and finally, from eighteen to twenty-five, the last teeth of this category, or wisdom teeth.

The second dentition is seldom accompanied, like the first, with serious disorders, or intense reactions upon the principal organs of the economy. The labor of eruption is progressing with more slowness than that which preceded it; when it takes place, the subjects are more developed, their functions already have a more permanent equilibrium; finally, these teeth appearing almost as soon as their predecessors have fallen off, have not to overcome the resistance of the tissues of the gums. It is generally only on the occasion of new permanent teeth, such as large molars, or more particularly wisdom teeth, or anomalies in the direction of the other teeth, that we see accidents, local and general, which it may become necessary to remedy.

If, then, the epoch at which begins the shedding of the twenty deciduous teeth, generally constitutes a period critical for children, it is less on account of the labor of which the dental apparatus is the seat at that time, than in consequence of the new enlargement assumed by all the parts of the organism, manifested by this very labor.

But if it is so concerning general health and preservation of life, it is not the same as regards the special disposition and arrangement of the maxillary apparatus. During the second dentition, it acquires its definitive conformation, its more or less irregular arrangement. During that time, results are produced, which shall be, in many cases, lasting as life. This period,

then, is of an extreme importance respecting the conformation of the mouth, and during all its progress, the dentist should be called to exercise all his skill and care. When the second dentition is completed, the teeth symmetrically arranged on the alveolar ridges of both jaws, should form two regular lines, representing the two halves of an ovoid, of which the superior arch constitutes the larger half, and the inferior the smaller one. The convexity of the former brought near to the latter, is more flaring out, more rounded. The teeth which it supports, are more voluminous and slightly inclined forward; whence it results that they cover the inferior ones, and gently overlap them. The direct antagonism only begins at the molar teeth. The length and projection within and without, should be equal over all the maxillary line; each tooth should present a smooth and polished surface, perfectly parallel to the curved surface which it fills up, so as to contribute to the harmony of the whole.

The texture of the teeth includes numerous varieties as regards appearance and solidity. Several characteristics resulting from these differences, are hereditary or transmissable from parents to children; others appear to be proper to certain countries; some are attributable to special hygienic habits, to the use of certain substances, such as tobacco, betel, or that of aliments or drinks, variable in composition, density, temperature, etc.; finally, the individual regimen, and the general constitution of the subjects, exercise over the texture of the teeth an incontestable influence. Teeth of a bluish, milky-white, as if transparent, are generally delicate, irritable, little resisting; they are met with, usually, in lymphatic, nervous, delicate subjects, predisposed to strumous affections. The most solid teeth are of an opaque yellowish-white, approximating the color of the bones. They are one of the characteristics of a robust, bilious, or sanguine temperament, and are usually connected with activity and power of the digestive organs. Women generally have teeth smaller, and of a more brilliant white, than men.

The perfection of the structure of teeth, and their resistance

to the various causes of diseases and destruction to which they are exposed, depend less on the proportions of the calcareous salts entering into their composition, than on the good constitution of their organic element. From the analysis made by M. Lassaigne, milk teeth contain more phosphate of lime than the permanent teeth, (67 per cent. to 61 per cent.,) and are, nevertheless, less durable. In the skeleton, the bones, in taking up saline principles, become more friable, and more easily fractured. If we find in the structure of the teeth, and in that of the bony system, the impress of the vital energies of individuals, this impress is manifestly connected with the organic part of the tissue, presiding to the nutrition of the organ, not with its inert constituents, whose abundance, mollicular arrangement and cohesion are subordinate to the conditions of life.

§ 2. *Accidents.*—In consequence of this incontestable fact, that permanent teeth are formed and developed as early as the first period of life, it is evident that the observance or neglect of the rules of hygiene during these periods, the manifestations or absence of maladies in young subjects, must exert a notable influence upon the qualities of the teeth as upon the whole of the living economy. This influence had not escaped the father of medicine: these judicious remarks have been confirmed by the best modern observers, especially M. Mohon, who has extended and defined them. Struck with the importance of this subject, both as regards physiology and appreciation, it has been for a long time the object of my researches in public institutions, as well as in my private practice. My observations, compared with those of others, recently published, have led me to some results not entirely devoid of interest.

If a child, between birth and the age of twelve or eighteen months, is affected with one of those serious disorders which strongly shake the constitution, such as convulsions, cerebral fever, softening of the osseous tissue, the four permanent incisors, the canines, and the first large molars, will most usually exhibit on their surface, transverse lines, more or less deep, asperities, small pits, with dark stains, and their free edge will remain denticulated, sharp. Sometimes they will be found yel-

lowish, slender, stunted. The situation of these alterations at the same horizontal height, on several of the teeth effected, indicates that the latter have simultaneously undergone the effect of the cause modifying their structure. If the disease liable to produce these effects manifests itself at a later period, say from two to four years, the bicuspids and the second molars will be liable to be impaired; the teeth precedingly mentioned having their crowns formed, remain, on the contrary, in their normal condition.

The interference attributable to the diseases of children in the organization of the teeth, is not always revealed under the same appearance. Sometimes, in the place of striated lines or black punctures, dividing the crowns, we find irregular stains of an opaque or yellowish-white, which, without impairing the polish of the enamel, give it an unpleasant appearance. Finally, the alteration of the dental structure may escape observation, whether it involves the roots or the dentine exclusively. Thus, in many subjects, teeth symmetrically arranged at the two sides of the median line, and in both jaws, are attacked at the same epochs of life by morbid affections of similar nature, and are destroyed in consequence of indentical affections, whilst the remainder of the teeth preserve their normal condition, and frequently remain healthy in the mouth to a far advanced age. These phenomena indicate a common action, probably exerted at the same time on the organs which experience the same fate, whilst the neighboring organs, of a same nature, but of which the development has not been disturbed, preserve their integrity.

As I have already noticed, the second dentition is always less laborious than the first. We can, however, not unfrequently observe, during its progress, some more or less serious accidents. The gums often become tumefied, red, painful, and in some subjects this turgescence is propagated to the different parts of the mouth, and even to the pharynx. We also observe in a few children, an abundant flow of saliva, numerous aphthæ, or even small ulcers, produced by the softening of the more inflamed points. To these local symptoms are added, when they are intense, heat in the mouth, thirst, restlessness, sometimes

fever, and more rarely, nervous accidents. During the entire process, children are, moreover, exposed to various irritations, such as sore eyes, headache, general, or limited to one side of the head, bran-like eruptions on the face or scalp, engorgement of the lymphatic ganglions, submaxillary parotidian, and cervical. In lymphatic subjects these transient glandular inflammations have a decided tendency to become permanent, and constitute the origin of scrofulous tumors.

In a great number of subjects we notice, towards the age of ten to twelve years, various disturbances of digestion, a general and unaccountable malaise, paleness, and other indispositions, which we can attribute only to the preparatory labor for the eruption of the bicuspids, the second molars, or the canine teeth. These phenomena are the more marked, as those teeth are larger, and consequently exert a more considerable dilating pressure on the alveolar walls.

The eruption of the wisdom teeth is more particularly difficult, and very often painful. These teeth do not always find room enough to place themselves. Pressed between the molars and the base of the coronoid apophyni, the wisdom teeth of the lower jaw often cause dull, deep pains, shooting to the ear, to the temporal region, to the entire side of the face, and having irregular exacerbations, which, according to the age of the patients and their antecedents, have often been taken for rheumatic or neuralgic affections. Those of the upper jaw more readily deviate backward, raise up the intermaxillary commissure, and more commonly cause pain in the maxillary sinus, in the ear, and in some subjects obstinate opthalmia, the cause of which frequently remains unknown. Finally, in certain cases, we observe persisting pains in the face, sick headache, and especially a persisting seclusion of the jaws, to a point rendering the introduction and mastication of food very difficult.

In regard to the local accidents, I must add that the irritation kept up by the labor of volution of the permanent teeth, and especially the wisdom teeth, is often accompanied with swellings, followed by abscess opening along the maxillary ridge, or even outside the mouth at some distance from the seat of disease.

These openings remain fistulous as long as the teeth which keep them up is not extracted. Their origin may be the more difficult to ascertain, as in many cases the patient feels and complains of no pains in the part affected. I have seen fistulæ of this kind which had afflicted the patient for eighteen months, or even several years, the cure of which followed in a few days the extraction of the teeth which caused them.

All the affections which I have just briefly reviewed, have their origin in the exaggerated irradiations of dental congestion toward the adjacent parts, and their diagnosis is often surrounded with much difficulty and uncertainty. In the absence of local alterations, enlightening him at once, the practitioner should be guided by the attentive observation of the morbid phenomena, making due allowance for their origin, obstinacy and succession. The accidents, whatever be their nature and their seat, have almost always a characteristic of their having manifested themselves without an apparent cause, externally or internally, their resisting the usual means of therapeutics, their appearance or disappearance without a plausible reason, according to the increase or decrease of energy assumed by the dental evolutions.

In the greater number of subjects the eruption of permanent teeth, and more particularly that of the wisdom teeth, is accomplished only by a series of efforts, which nature seems to abandon to a certain degree, to resume them afterwards with the same train of morbid phenomena, the duration of which is prolonged sometimes during several years. These sorts of fits, reproduced at variable intervals, almost always obscure the diagnosis, and tend to lead the practitioner into error, until the more attentive observations of these phenomena indicates at last the nature of the disorder.

The indications to remedy the accidents of irritation and phlogous just mentioned, are generally simple and efficacious. They do not essentially differ from those claimed, under the same circumstances, by the first dentitions. We must still employ assuaging means, local sedatives; in some cases determine gargles, punctures on the alveolar ridges, capillary depletion by means of leeches; and finally, when the gums remain raised up

or imperfectly perforated, the crucial incision will destroy the tensions, and cause the pain to cease almost instantaneously.

It results from my numerous observations, that the operation of lancing the gums in the cases requiring it, is the more efficacious during the second dentition than during the first. When we have to facilitate the eruption of permanent teeth, the disposition of the parts and the local phenomena render, almost always, the indications precise, and the age of the patient permits them to lend themselves to the operation, as well as to bear it better.

In some cases, when the wisdom tooth does not find at the extremity of the arch, sufficient room, it becomes absolutely necessary to remove it, or to create for it the room it requires, by extracting the molar tooth immediately preceding it; but this operation being one of those which may be necessitated for the proper arrangement of the teeth, we shall again refer to it.

As I have observed, in speaking of the first dentition, it may happen that the accidents of the second be determined by the simultaneous eruption of a certain number of teeth, and by the too great amount of labor resulting from it. One of the most interesting cases of this kind is related by M. Delabarre. He states that a female child, eight years of age, of a very nervous-sanguine temperament, complained of pain in several deciduous molars. Soon a slight cough, the dilatations of the pupil, the increased irritation, loss of sleep, caused recourse to be had to the physician. Notwithstanding the judicious exhibition of sedatives, the accidents persisted without its being possible to recognize any characterized disorder. Later, febrile exacerbations appeared during the day, and delirium at night. During the intermissions, pain in the teeth.

M. Delabarre, called in his turn, thought that the accidents were caused by the too great promptitude with which the eruption of the permanent teeth was taking place. In fact, the right central, the two lateral incisors, and four bicuspids displayed their crowns at the opening of the appendices of the dental matrices. The absorption of the roots of the deciduous teeth had not had time to take place, and several of these teeth were

pushed forward by the new ones. The gums were red and sensitive.

Two of the teeth, which appeared to form the greater obstacle, were extracted, and on the same day the fever ceased. The difficulty seemed to be removed; but four days after, the primitive accidents reappeared, and it was necessary to extract the two deciduous molars opposing the eruption of the bicuspids. Then only did all the symptoms diminish, and in a few days convalescence was perfect.

I have met in my own practice with a tolerable number of cases analogous to that of M. Delabarre, and by relieving the mouth of the too persisting deciduous teeth, have equally seen the accidents cease promptly. It must be remarked, however, that the extraction of these teeth should take place only when we have the certainty of the presence and forward development of the subjacent teeth; by a premature extraction, we would expose ourselves to wound or destroy the others, and even destroy their germ, as has been observed after similar operations performed on very young subjects; the loss occasioned by such malpractice is thus irretrievable.—*Dental News Letter.*

QUARTERLY SUMMARY.

DENTAL SCIENCE.

1.—*Treatment of Exposed Dental Pulps preparatory to Filling.*—Professor J. D. White, M. D., in an inaugural thesis on the treatment of exposed dental pulps preparatory to filling, presented to the faculty of the Jefferson Medical College, session 1843-4, and published in the Dental News Letter for July, 1853, after describing the anatomy of the teeth, the structure of dentine, enamel, cementum

and the manner of the formation of these several dental constituents, enumerates the membranes of the teeth; then notices the different opinions concerning the organization of these organs; after which he proceeds to show, that when the pulp of a tooth becomes exposed to the action of the fluids of the mouth and atmospheric air, by the loss of a portion of the crown, it soon becomes the seat of active inflammation. When the inflammation is permitted to run its course, the injury sustained by the tooth, the author then goes on to show, is usually so great as to preclude the restoration of the organ, especially if it be a molar, to usefulness. But, as it sometimes happens when the inflammation is mild, and terminates with the sloughing of the pulp at the apex of the root, the tooth may be made to subserve the purposes for which nature intended it, for many years, by being properly filled. Assuming this to be true, he believes it to be the duty of the dentist either to combat the inflammation, or, in all cases where caries has extended to the chamber of the tooth, to destroy the pulp at once with a view of arresting the progress of the disease before the neighboring structures shall have become implicated. This he regards as the least of two evils.

As some authors entertain the belief that where the pulp of a tooth is destroyed, the organ becomes to all intents a foreign body, and must necessarily, if permitted to remain in the mouth, act as a morbid irritant, professor W., enters into an argument to show, that the dental periosteum may supply a sufficient amount of vitality to prevent it from producing this effect. This view of the subject is supported by the fact, that teeth have remained in the mouth for years, with impunity, after the extirpation of the pulp, and the obliteration, by filling, of the chamber of the organ. One example is cited, in which a tooth had been thus preserved for thirty years. The cause of the irritation sometimes observed in the sockets and gums of the teeth, after the destruction of the pulp, the author believes to be principally owing to the admission of air and the fluids of the mouth, through the foramina to the apices of the roots.

As the pulp, after it has become exposed, assumes a pathological condition, the object of the dentist should be to prevent the consequences likely to arise from it, and at the same time to secure the retention of the tooth.

[To be Continued.]

2.—*Filling Teeth over Exposed Nerves.*—Dr. W. G. Oliver states, in the Dental News Letter, July, 1853, that where a nerve is exposed, whether recent or otherwise, he does not hesitate to fill the tooth, provided the cavity will hold a plug. If the tooth has ached, or soreness supervenes, he applies camphorated ether on a bit of cotton, then drills a hole through the organ to the channel of the nerve, carrying the instrument far enough to cut through the nerve; after which, the tooth may be filled in the usual manner. This method of procedure, he says, he has practiced for more than seven years, without having failed in more than one in a hundred cases.

The above method is somewhat similar to that recommended by Drs. Hullihen and Miller.

3.—*Inflammation of Dentine.*—Increased sensibility and excessive tenderness so frequently observed in dentine remote from the pulp of the tooth, professor Townsend, see Dental News Letter, April and July Nos., 1853, regards as certain indications of inflammation. The reason that all the phenomena characteristic of a pathological condition of this sort in other parts of the body, such as increased heat, redness and pain, is not observed here, is owing to the fact that the vessels of dentine are too small to circulate red blood, and the unyielding nature of tooth-bone will not admit of their expansion. Sound teeth are susceptible to impression both from sweet and sour fluids, while a tooth deprived of vitality is not endowed with such attributes, a dead tooth is generally more susceptible to impressions from heat, a fact which would seem to favor the idea that it was a better conductor, and that it has lost the power of regulating its own temperature, a power belonging to healthy living parts. The truth of this is shown by a case recorded by Dr. George McClelland, who in the extirpation of the parotid gland, removed the portio dura of the seventh pair of nerves, causing paralysis of the cheek. Afterwards, the cheek was so remarkably susceptible to impressions of heat and cold, that in a hot room, it often became necessary to apply cold water, while the sound cheek was not unpleasantly affected. When exposed to a low temperature, the paralyzed cheek had to be defended from the cold.

Inflammation of dentine may be destructive, and produce caries or ulceration, but when the diseased part is removed, the surrounding sound bone will not evince any sensibility. The most sensitive

portions of a tooth are often near the surface or immediately beneath the enamel, at the extremities of the nervous fibres, where the largest amount of sensation appears to reside, the larger branches serving only as so many conduits for the conveyance of the vital fluid, and to convey impressions from the extremities to the brain. Lesions of the crown of a tooth, whether the result of mechanical violence or the action of corrosive agents increase the susceptibility of dentine to painful impressions.

"But when the dental nerve and artery are removed by the excavation and clearing of the fangs, something is taken away that is, more or less, essential to the life of the tooth? Certainly. It is not pretended that parts having such offices as those which make up what we call the pulp, are merely indifferent to the constitution and functions of the tooth. If the common motor and sensitive nerve of a muscle be cut, compressed, or removed, the sensibility to external impressions, and the power of voluntary motion, which they previously conferred upon the muscle, are lost. The muscle is palsied. Is it, therefore, dead? No. It lives as an individual organism, but it has lost its instrumental uses. These uses were its mobility and that sensibility to external impressions which are conveyed to the brain or seat of consciousness. But the mobility proper to its arteries, veins and lymphatics is untouched, and its organic sensibility remains unhurt, for every fibre retains the appetencies, or organic sensibility which is concerned in nutrition, growth and the reparation of parts. It, the muscle, lives on, as the stomach, liver, bowels, lacteals and great arteries in the abdomen and thorax live.

"The processes essential to its own peculiar vitality are carried on as before. All that has happened is the loss of voluntary motion and consciousness, and the consequences of these, whatever they are: it is simply a paralyzed member, paralyzed in motion and perception—these are essential to its related functions. But how is it with a tooth? It has no voluntary motion proper, and the loss of a nerve of the motor kind, leaves it capable of playing anvil, cutter, grinder or crusher as before. Its normal character is immobility and solidity. These properties conform it to its active functions or animal uses. Most probably the maxillary branches of the fifth pair of cerebral nerves, are not motor nerves at all: one branch of this same pair is regarded as a nerve of taste, or gustatory nerve, while it is the ninth pair which give voluntary motion to the tongue. I think it probable enough that the lingual branch of the fifth pair has the function of taste, because the two other branches of this great trigeminal trunk are distributed to the teeth, most probably to endow them with that kind of sense which is nearly allied to taste. If so, the harmony of their office with that of the tongue, in alimentation, would be explained, as well as their perception of sweet and sour, which we certainly have by the teeth, though it is the tongue which enables us to give them their fully distinct recognition. It is, I

believe, a well established doctrine, that nerves coming from the same tract or cerebral or spinal mass, have like functions. If one branch of the fifth pair is the gustatory nerve, the functions of the other two, the upper and lower maxillary branches, very likely, have some office analogous to this. That is its sensitive root, for it has a sensitive as well as a motor root, like the spinal nerves, (and it is the only one of the cerebral nerves that has such double root.) Its sensitive root may have the function of taste, and the motor division be designed to supply voluntary motion to the skin and muscles of the eyelids, nose, lips and jaws, to which branches are distributed; indeed, its distribution upon the face and bones, and its connection with the organs of the senses, is so general, that it has been called the great sympathetic nerve of the face. Certain it is, that the teeth get no voluntary motion in their sockets from the maxillary nerve, and it is much more probable that the sensitiveness which it gives, is rather related to taste than to the perception of the common properties of bodies, such as the fingers and skin possess. The sense of resistance, or the perception of hardness and softness, may be had in the gums, or by the pressure of the cheeks, tongue, palate, lips and other parts; and the modification of touch which we have in the mouth, for the purposes of mastication, can be well supplied by parts situated there, other than the teeth; indeed, their great solidity makes them unfit to be impressed by the mere tact of bodies, while the soft parts of the mouth may better serve that purpose.

"Now, putting all these speculations together, and adopting them, for want of better light upon the subject, we will have the tooth whose pulp is destroyed, deprived only of its modified sense of taste; for touch, in the strict meaning of the word, and motion, it has not; and this deprivation will leave it adequate to all its uses as a masticating organ, and the use it serves as a part of the vocal apparatus; and, if only its organic life can be maintained, it may be allowed to remain, with excellent right to the room it occupies. So far, we have it a grinder or cutter, and a reverberator or warder of vocal sound, as good as ever, and only deprived of its sense of feeling, whatever that be, whether dental taste or whatever else it may be termed. Its continued existence, with this defect, (which defect the remaining teeth may very well supply,) will depend upon the maintenance of the circulation in it, of sufficient perfectness for the purposes of nutrition, and the absorption which goes hand in hand with the sanguineous supply in all living parts. To secure this, it is only necessary that the blood-vessels which reach the tooth externally, through the medium of the investing membrane or periosteum, be alive and healthy; for, the subsidiary inosculation between the capillary branches of the internal and external arteries, will keep all the interior abundantly supplied, under a provision of nature which meets the changes of action which occur continually, and those interruptions and destruction of vessels which happen as incidents occasionally. The capillaries which remain connected with

their trunk enlarge, and assume the double duty of supplying both sides or sections of any part that needs such accommodation. Thus, then, that interior portion of the tooth which the dental artery at first furnished with the nutritious fluid, may be sufficiently supplied, and thus, I have attempted to give some of the reasons for the possibility of a tooth remaining a useful member of the mouth, after it has been deprived of its primitive internal circulation."

4.—*Extraction of Teeth.*—The continuation of Dr. J. Taylor's article on the extraction of teeth, as published in the Dental Register, April No., 1853, we copied entire into the last (July) No., of the Journal, and if space permitted, we would transfer the entire paper to our pages, but as we cannot do this, we present the following summary of the remainder, contained in the July No. of the Register.

The forceps enumerated by Dr. T., for the extraction of the teeth of the upper jaw, as described in the article copied into the last No. of the Journal, consist of four molar forceps, two for either side, a dens sapientiæ, and a bicuspid forcep. To these he adds a small pair for the lateral incisors, and two pair for the molars—one for either side, with the outer beak brought to a point to pass between the buccal roots.* For the lower molars, he recommends the use of two pair—one for the right and one for the left side. The right is a hawk's-bill, one beak passing over the crown of the tooth is adapted to the lingual surface. The bar of the instrument is slightly curved, to enable the operator to grasp a second or third as readily as a first molar. The end of one of the handles is curved, passing round the little finger. When the instrument is in the hand of the operator, the beaks are fitted to the necks of the teeth, with a central point to each to pass between the roots of the teeth, so that when these are straight, the mere closing of the instrument will sometimes raise the organ from the socket. The beaks of the instrument for the left side, are adapted in the same manner, but is put together differently. It opens to the right and left instead of up and down, and has two curves, the beak being turned downwards. It is also bent near the joint, or rather between this and where the handles are fitted to the hands, in a direction towards the operator.

* These forceps are known as Maynard's forceps.

The hawk's-bill forcep, (with the ends of the beaks crescent, we presume,) is used for the bicuspids and cuspidatus of the right side, and straight or curved root forceps for the incisors.

For the removal of the lower dentes sapientiæ, he recommends what is usually called Physic's Elevator*—an instrument shaped something like a pair of forceps. The blades vary in length from half an inch to an inch. They are concave on their outer and convex on their inner surface, and bent to near a right angle with the handles of the instrument. The blades are applied between the second molar and wisdom tooth, lifting the latter, as they are forced together by closing the handles, from the socket. The blades, however, should be forced firmly against the wisdom tooth.

But the use of this instrument is only applicable when the approximal surfaces of the second molar and wisdom tooth are sufficiently sound to resist the pressure. Nor can it be employed when the second molar is wanting, or has become very much loosened in its socket. After the dens sapientiæ has been raised from its socket, it is usually necessary to have recourse to a pair of forceps for its removal.

The forceps employed by Dr. T. for the extraction of roots of teeth, consist of three or four pair, with very sharp, well-tempered beaks, varying in their curve from straight to nearly a right angle.

For the extraction of a lower molar on the right side, the author adopts the following method of procedure: he stands a little to the right and behind his patient, on a stool, then adjusts the instrument to the tooth, and with an upward and outward movement—an inward motion, with this description of instrument, to any extent, being inadmissible when the crown of the tooth stands inward, the tooth is loosened and lifted from the socket. But when the roots are much separated, as is often the case with the first molar, it may be necessary to move it inwards, outwards and backwards, before it can be extricated. When the crown is very much decayed the instrument should be forced upon the neck as far as possible, to prevent the liabily of breaking it, applying, at the same time, an outward and inward motion, before exerting any direct extractive force. If, notwithstanding, the crown breaks below the edge of the gum, the roots are removed with one or other of the forceps

*Dr. Physic was indebted for the idea of this instrument to Dr. L. S. Parmly, who exhibited it to him soon after he invented it. It should, therefore, be called Parmly's Elevator.—*Eds.*

already described for their removal, securing a firm hold by forcing the beaks down to the edge of the alveolus. If the crown breaks down to the edge of the alveolus, the gum is separated and the socket cut away sufficiently to admit of the application of hawk's-bill forceps, with a single pointed beak, securing a hold between the roots, then, with an inward and outward motion, they are loosened and raised from the socket. If one should remain, it may afterwards be easily removed with a pair of root forceps. It sometimes happens that the disposition of the roots is such as to render their separation from the crown, previously to removal, absolutely necessary. An example of the kind is given by our author.

5.—*Irregularity of the Teeth.*—In a paper read before the Mississippi Valley Association of Dental Surgeons, published in the July (1853,) No. of the Dental Register, Dr. Hamell expresses the belief, that irregularity of the teeth is the result of functional derangement during dentition, and that its existence increases the liability of these organs to disease, and is productive of an unhealthy action in the parts with which they are immediately surrounded. In view of these considerations, the author urges the importance of more attention, on the part of dentists, to orthodontia, than is usually bestowed upon this specialty of dentistry.

The period when the resources of art can be most efficiently applied in remedying deformities of this kind, is, he says, previously to the sixteenth year, although it may often be had recourse to, successfully, at a much later period. The means must be varied to suit the peculiarities of each individual case.

6.—*Caries of the Teeth.*—In the April number of the Journal we gave a brief summary of the views of Professor J. Taylor, as expressed in the first part of his answer to certain interrogatories proposed to the late Dr. Drake, on the subject of caries of the teeth. The April and July numbers of the Dental Register contain the remainder of Prof. T's reply.

The premature decay of the temporary teeth, he attributes to physical imperfection, derived from the parent, and to chemicalaction of vitiated secretions of the mouth, arising from constitutional

disease, or other corrosive agents. The truth of this opinion has been abundantly confirmed by observation, and that the greater liability of the deciduous, than the permanent teeth to decay, is attributable to the less perfect organization of the former than the latter, and to their more constant exposure to the action of diseased buccal fluids, and other external destructive agents, such as acidulated candies, &c.

In reply to the second question propounded by Dr. Drake, "To what causes, external or pathological, local or constitutional, shall we ascribe the premature decay of the second teeth in the west," and, "Is a hereditary, scrofulous diathesis a cause of infirm teeth?"

To this question, Dr. T. replies, in substance, that the operation of a constitutional cause, which would affect, injuriously, the physical condition of the temporary teeth, would operate similarly upon the replacing organs. He notices the influence of diet and constitutional disease on the functions of the formative organs of the teeth. He next alludes to the effects of a disordered condition of the alimentary canal upon the secretions, and, as a consequence, the irritable condition of the gums, which, around the necks of the teeth inflamed, the mucous secretions, under such circumstances, are acidulated, and when left on the teeth, act upon the parts with which they are in contact, causing decomposition of their earthy salts. This effect is the more marked on those parts where it remains longest, and is not freely mixed with saliva, and the dentine and enamel are not very close and compact in their texture. Improvement of the state of the constitutional health is followed by a lessened tendency of the teeth to decay. Thus, an "hereditary, scrofulous diathesis" is regarded as "a cause of infirm teeth."

Among the external local causes not yet enumerated, are the oxalic, sulphuric and succinic acids, all of which have a stronger affinity for the lime of the teeth than the phosphoric, with which it is combined. The citric also acts upon it, though not as rapidly as do nearly all the other acids, both vegetable and mineral.

A crowded arrangement of the teeth, favoring the retention of corrosive agents, contributes to the decay of these organs.

In answer to the question, "Is dyspepsia a cause of early decay?" and, "does the acid thrown up by many dyspeptics, in paroxysm of that disease, act chemically on the teeth?" Dr. T. notices, first, the acid condition of the secretions of the mouth in persons afflicted with this disease, then enters into an investigation

of the chemical qualities of the gastric juice, both in health and disease, referring to the researches of Schwann, Prout, Gmelin, Tiedeman, Simon, Hünefeld, Dungleson, Blondlot, and others, which, though the results are somewhat varied, all tend to establish the existence of a free acid. From the facts thus established, he arrives at the conclusion, that when the gastric fluid is brought in frequent contact with the teeth, its effects are injurious to them.

7.—*Springing of Plates.*—Dr. S. D. Muse recommends, in Dental Register, July No., 1853, the enclosure of a piece about to be soldered in an iron wire, about a line in diameter, bent in the following form, ΛΛΛΛ. Thus prepared, a piece of sufficient length to form a belt to enclose the piece, is put in shape by bringing the two ends together and fastening. The width of this belt should be about as thick as the iron band usually employed. This belt is now encircled by another piece of wire of the same size, about one-fourth of an inch all around; it is next made fast at opposite points with a piece of wrapping wire, using the precaution to draw it as tight at one point as at another. This done, a rim of pasteboard is placed around the belt, a paste of sand and plaster is poured in until the piece is imbedded. This having set, the pasteboard rim is removed, and the ties clipt which bind the outside wire to the belt. When the paste has thoroughly dried, the work is placed on the apex of a charcoal cone built over a fire on the hearth, solder and borax having been previously applied. The piece heats up evenly and gradually. During this process, burning coals are placed around it, keeping one the whole time over the teeth. As soon as the mass is at a lively red heat, it is placed on a piece of charcoal, scooped out and well ignited, when in a short time the soldering is completed, and the plate not sprung.

The advantages of the wire-belt over the iron band, is, that it does not crush the mass or derange the work in contracting, and it yields to the expansion of the plate, and is less cumbersome.

8.—*Plate Teeth.*—Dr. J. S. Clark, dentist of New Orleans, says in Dental Register, July, 1853, he never secures a plate in the mouth by means of clasps passed between remaining natural teeth, but depends on a mere bearing against the palatine surface on each

side, and perfect accuracy of adaptation for the retention of the piece, and carrying it back as far as possible for the bearings, that the average of the base may bear a large proportion to the average of the tooth. In some cases, the bearings are made wholly on fillings introduced expressly for the purpose. The object of this is to prevent injury to the natural teeth resulting from the retention of the secretions of the mouth between them and the clasps.

In applying backings to teeth, he objects to covering the whole of the palatine surface, as it gives to them an opaque appearance. In replacing the loss of bicuspids, artificial cuspids are in many cases preferable to substitutes with two cusps.

9.—*Application of Teeth on a Plate to the Roots of Natural Teeth.*—Dr. J. S. Clark, recommends in Dental Register, July 1853, the application of plates with artificial teeth to roots of the teeth to be replaced. They are first, thoroughly cleansed, filled and filed down to the gums. This method, he believes, to be preferable to the removal of the roots, as the natural appearance and contour of the mouth will be more effectually preserved, and without any injurious effects resulting from their retention.

10.—*Intermittent Odontalgia.*—Dr. H. R. Smith, dentist, of Terre Haute, Ind., relates in the Dental Register, for July, 1853, the case of Mr. G———, aged forty, who suffered severe paroxysms of pain in a right superior bicuspid, which came on regularly at 8, A. M. and at 7, P. M. every day, each lasting about two hours. He was completely relieved by a cathartic of calomel, and the free use of quinine.

11.—*Blow-Pipe.*—J. B. Williams, dentist, of Monongahela City, Pa., describes in the Dental Register, July, 1853, a permanent blow-pipe, capable of producing a constant, steady blast, of any desired strength.

"It consists of three short zinc cylinders, placed one within another, thirty-six inches in length. The largest cylinder is twelve inches in diameter; the inner, smallest cylinder, is eleven-and-a-half inches in diameter; these are soldered together at the lower end, leaving a

narrow space of about one-fourth or one-half an inch between them. This space is partly filled with water, and the third or middle cylinder being closed at the upper end, is made to pass down into it, and nearly adjusted to the inner surface of the outer cylinder, so as to pass between it and the inner one without much friction."

"The smallest inner cylinder is closed also at the upper end, except a small opening at the centre, in which a one-half inch lead pipe is soldered, that passes out at the open end below, and taken up through the end of the work bench, where a brass stopcock to regulate the blast, is screwed into the end of the pipe."

To this a gum elastic tube eighteen inches in length, with a jet pipe at its outer end, is fastened, and kept in any desired position by means of wires.

"A strong cord passed over a six inch pully, fixed to the ceiling, is attached to a head of wood one-and-a-half inches thick, placed within the upper end of the movable cylinder, the other two cylinders being stationary, raised about twelve inches from the floor; upon this head weights are placed. About one-fourth inch of the outer edge of the movable middle cylinder, is bent in upon the head of the wood to hold it firmly."

A valve, accurately fitted by being turned in a lathe, three-fourths of an inch in diameter, one-half inch thick, with a stem five-eighths of an inch in diameter, three inches long, and made of zinc, is passed through the head of wood, soldered to that of the zinc within, the valve being inwards. A coil of wire is placed around the stem, attached at its upper end, of sufficient strength to hold it up gently. Thus arranged, the whole is worked with one hand, while the other is at liberty. A fluid lamp, having a flat tube two inches long, three-fourths of an inch broad, and one-fourth thick, beveled at the end, with a close fitting slide and cap, projecting from its side near the top, is used.

A small spigot is placed at the bottom of the stationary cylinder, by which the water may be drawn off in very cold weather, to prevent it from freezing.

Dr. W. states that he found it necessary to place a cylinder of wood within the inner cylinder, as the power of the blast is so great, to prevent it from collapsing.

The apparatus, he thinks, may be made at a cost of about ten dollars.

12.—*Risodontryphy.*—F. Y. Clark, dentist, of Griffin, Georgia, says in Dental News Letter, July No., 1853, that he has performed the above operation thirty times, and has only failed in three cases. In performing the operation, he uses nothing but a simple finger drill, made from a common excavator, making the point spear-shape, as recommended by Dr. Hullihen, with one cutting edge a little longer than the other. The advantage of an instrument of this kind over a bow-drill, is, that it leaves one hand at liberty to control the head, and the motion and pressure can be more readily lessened as the point of the instrument approaches the nerve cavity, whereby, small particles of dentine may be prevented from entering the cavity with the point of the instrument.

13.—*New Odontalgic Remedy.*—Dr. D. R. Whipple recommends, in July No., Dental News Letter, 1853, the oil of turpentine, (oleum serebinthinæ) as a remedy for tooth-ache, applied on a pellet to the affected tooth, securing it with a little dry cotton. It is particularly applicable in cases where the pain results from inflammation of the nerve, and from irritation produced by wounding the pulp. In such cases, it affords almost immediate relief.

14.—*Swaging Plates.*—D. H. Taylor, dentist, of Newark, Ohio, adopts the following method for making castings and swaging plates: An impression having been taken, the first metallic cast is obtained in the usual way, it is coated with a thin batter, made by mixing whiting in a thin solution of gum arabic in water, to the thickness of the plate to be swaged. When this becomes dry and hard, tin or zinc is melted and poured on the model thus prepared. When cold the pieces are separated, and the whiting washed from the first casting. Between these, the plate is accurately swaged, and when gotten up in this manner, it is not liable to spring. *Dental News Letter.*

15.—*Preparing the Mouth for full sets of Artificial Teeth.*—In the Dental News Letter, July, 1853, A. T. Williard, dentist, of Chelsea, Mass., recommends clipping off the apices of the gums between the sockets of the teeth, then dissecting back the fibro-mucous tissue from the alveolar border, and cutting off from a fourth

to three-eighths of an inch, so as to admit of the edges of the mucous tissue being brought together. The advantages of this method of procedure are stated to be, first, it diminishes the amount of inflammation; second, it saves nature the task of removing the parts thus taken away; third, it destroys the mucous follicles along the alveolar border, thereby expediting the consolidation of the parts; and lastly, the gums will be in a proper condition for the reception of artificial teeth, four or five months sooner than they would, were the removal of the edge of the alveolar ridge left to the operation of nature, and besides, it has a better shape for the reception of a dental substitute.

16.—*The Teeth, in respect to Character.*—In an article under this head, published in the August (1853) No., of the New York Dental Recorder, Dr. A. Hill, the junior editor and author, after a few interesting and very appropriate introductory remarks, states, that if we were permitted fully to comprehend the entire relationship existing between the different organs of the human system, one class of organs would reveal to us the peculiar character of each; and thus, by witnessing *one* fact, we could easily infer many important considerations pertaining to it. But since our knowledge is necessarily so limited and imperfect, and the action of one class of organs so modified by another, we can only hope to approximate the truth somewhat remotely.

Referring to the fact, that Cuvier, the great naturalist, from his knowledge of the relationship of the different parts of the body, was enabled to reconstruct the animal of an extinct species from a mere fragmentary part of the frame work, and to determine the peculiar habits of the animal, its mode of life, food, &c., he believes, that much may be inferred of the character of an individual from the shape, size, position, and number of his teeth, and that these determine the shape of the dental arch, to which the lips correspond. These features must ever hold a controlling influence over the countenance, and the characteristics of the mouth and teeth constitute the strongest peculiarity by which the inferior animals are distinguished.

It is frequently instinctively said, on beholding an individual for the first time, that person has a very benevolent expression, that fellow looks miserably mean. The different and conflicting traits

of character, are distinctly and instinctively read. The flat nose, thick lips, elliptical arch and large herbiverous teeth, are distinctive of the Africans, and to these correlative signs, the dental organs are specially related, and are altogether highly expressive of character. If these signs were removed, and their relations dissolved, the African would cease to be African.

Mr. Levison says: "If a number of national crania, were placed promiscuously on a table, I would undertake to arrange them ethnologically, according to their comparative degrees of civilization, merely by the form of their jaws, and the position of their teeth." If such marked changes are produced on the dental organism, with the resulting change in the nose and lips, a corresponding change of character may reasonably be inferred. These controlling signs are not more expressive in the negro, than in the North American Indian, or the Indians of the South Pacific Ocean. The distinction is not more marked between the teeth of the herbivorous and carnivorous animals, than between the teeth of the genuine African, and the native Feegean, and with the distinctive signs of which, there is a perfect correspondence and agreement of character. Thus, the ethnological signs furnished by the dental organism alone, are sufficient to mark the different degrees of civilization in the individual in which they are seen, as well as his peculiar distinctive traits of character. The preponderance of any special trait, may sometimes be so modified by circumstances as to render the signs somewhat difficult of recognition.

The peasantry from some of the rural districts of Ireland, especially among the females, furnish some of the finest specimens of dentition, both with respect to maxillary expansion and the development of the teeth—a crowded or irregular denture being comparatively rare among them. The physiognomical indications of a broad palatine arch, teeth regularly arranged, a finely expanded mouth and voluptuous lips, are expressive of noble and generous character, and constitute symbols that can never be associated with *essential meanness* or *sordid selfishness.* From such a mouth, language comes with the greatest fluency, and is invested with a charm which no other circumstance can impart.

"The broad grin, the mouth stretching from ear to ear, as it were, and the teeth circling in well developed order in the form of an ellipse—the cheeks dimpled in one place and puffed out in another, just ready to explode with real good nature, all conspire to represent the very soul of cheerfulness and benevolence.

"But where lines are drawn in an opposite direction, they most certainly represent an opposite character. And apropos, of a contracted mouth and puckered lips, are the tight drawn strings, and gathered border of a close drawn purse."

PHYSIOLOGICAL CHEMISTRY.

17.—*Saliva.*—In a review by Dr. Day of Bidder and Schmidt's recent investigations, we find an admirable account of the latest additions to our knowledge of the digestive fluids. The article on the subject of saliva, published in our last number, renders it unnecessary for us to do more than give those results which have been attained since its publication.

We find in this review, an analysis of saliva, by Jacubowitsch, which we subjoin:

Water, ...		995.16
Solid constituents:		
Epithelium, . : .	1.82	
Soluble organic matter, .	1.34	
Sulphocyanide of potassium, .	0.06	
Fixed salts, . . .	1.82	
		4.34
		1000.00

The 1.82 of fixed salts, consisted of phosphate of soda 0.94, lime 0.03, magnesia 0.01 and chlorides of sodium and potassium 0.84.

The "soluble organic matter" has been usually called *ptyalin*, and supposed to be the most energetic of the saccharifying constituents of the digestive fluids. Bidder and Schmidt do not believe it to be identical with the ptyalin of authors, or the salivary diastase of Mialhe, which they consider to be the product of the admixture of other substances.

The *sulphocyanide of potassium* was found by Kletizinsky to be most abundant after meals, and most deficient towards night. It is diminished by fasting, alcoholic drinks, iodine, salivation, and chronic disease. It is increased by spices and condiments, Peruvian balsam, musk and mental or emotional excitement. In infancy, old age and the later months of pregnancy, it is deficient.

Jacubowitsch has published analyses of the saliva of dogs, which we subjoin for the purpose of comparison.

a.—Ordinary or mixed saliva.

Water, ...		989.63
Solid residue,		
Epithelium and soluble organic matter, .	3.58	
Phosphate of soda, ...	0.82	
Chlorides of sodium and potassium and sulphocyanide of potassium, . . .	5.82	
Phosphates of lime and magnesia, .	0.15	
		10.37
		1000.00

b.—Saliva, excluding the parotid secretion.

Water, ...		990.48
Solid matters,		
Epithelium and soluble organic matter, .	4.25	
Phosphate of soda and chlorides of sodium and potassium, ...	4.08	
Phosphates of lime and magnesia, . .	1.19	
		9.52
		1000.00

c.—Saliva, excluding submaxillary secretion.

Water, ...		988.1
Solid residuum,		
Epithelium, ...	2.24	
Soluble organic matter, . . .	5.04	
Phosphate of soda and chlorides of sodium and potassium, ...	4.20	
Phosphates of lime and magnesia, .	0.42	
		11.9
		1000.00

d.—Saliva, excluding parotid and submaxillary secretions.

Water, ...		991.45
Solid matters,		
Epithelium and soluble organic matter, .	2.89	
Phosphate of soda and chlorides of sodium and potassium, ...	4.50	
Phosphates of lime and magnesia and carbonate of lime, ...	1.16	
		8.55
		1000.00

e.—Parotid saliva.

Water, ...		995.3
Solid residue,		
Epithelium and soluble organic matter, .	1.4	
Phosphates of soda, chlorides of sodium and potassium and sulphocyanide of potassium,	2.1	
Carbonate of lime, ...	1.2	
	—	4.7
		1000.00

These fluids contain no albumen, casein, chondrin nor pyin.

The *buccal mucus* contains, according to Jacubowitsch, who obtained it free from saliva by tying all the ducts before he experimented:

Water, ...		990.02
Solid residue,		
Organic matters, soluble in alcohol, . .	1.67	
" " insoluble " . .	2.18	
Fixed salts, ...	6.13	
	—	9.98
		1000.00

This fluid was viscid and frothy, extremely turbid (from the presence of a number of epithelium cells which did not settle, on standing,) and strongly *alkaline* in its reaction.

In regard to the *quantity* of saliva secreted in a given time, this memoir of Bidder and Schmidt has added much to our knowledge. These observers found that a dog weighing 16 kilogrammes (about 35 pounds) furnished in one hour from one of Wharton's ducts, 5.64 grammes* of saliva, so that the two submaxillary glands yielded in that time 11.28 grammes. One of the ducts of Steno discharged, in an equal time, 8.79 grammes of a clear, limpid secretion; the two parotids, therefore, secreted 17.58 grammes. Assuming that a man weighs four times as much as the dog, or 140 pounds, and that these secretions vary directly with the weight, the hourly secretion of the submaxillary glands would be 45 grammes, of the parotids 70 grammes. The daily secretion of both sets of glands, therefore,

* A gramme is nearly 15½ grains—or more exactly—15.434 grains. These weights, first adopted by the French, are retained because of their almost universal use in chemistry.

would be about six pounds, or a little more. Bidder and Schmidt think that a man actually discharges about half that quantity. They found, by direct experiment, that a man discharged from 100 to 120 grammes an hour. Three pounds may, therefore, be assumed as the average daily secretion.

The *physiological function* of the saliva may be regarded now as fully determined. The doubt which still overhung that question appears to be cleared up and all its difficulties disposed of. The conversion of the *amylacea* into dextrine, sugar and lactic acid, and the facilitation of the absorption of this class of food is clearly the use of this fluid, stationed at the inlet of the body.

The time required for this change is important to be known in estimating the physiological importance of the saliva. If a fresh decoction of starch, proved to be free from sugar, be mixed with an equal quantity of fresh saliva and the mixture agitated, it will instantly become thin and watery. On testing it, iodine no longer gives a blue tint, and Trommer's test clearly establishes the presence of sugar.

"The almost instantaneous induction of this action is a point which must not be overlooked in considering the question whether this is a special property of the saliva, or whether it is shared by other animal fluids. There can be no doubt, as we shall presently show, that in this respect the pancreatic and intestinal juices exactly coincide with the saliva, but when we find stress laid upon the circumstance that many other organic substances, as, for instance, nasal mucus, pieces of kidney, putrifying serum, &c., produce similar changes in eight or twelve hours, at 100° or upwards, we must recollect that at such a temperature, and after so long an interval, changes may be spontaneously set up in a solution of starch. There are, however, a number of animal substances which occasion the appearance of sugar, in a solution of starch, in so short a space of time, as altogether to exclude, in such cases, the suspicion of spontaneous metamorphosis; but the action induced by the saliva is incomparably more rapid even than that of any of these substances."

Bidder and Schmidt performed an extensive series of experiments to compare these other organic matters with saliva. They found that the saliva of adult men and their nasal mucus,* the saliva of a

* It must be observed that a little saliva might be mixed with nasal mucus, in sneezing, &c.—and that in other experiments with nasal mucus the change did not commence till after a quarter of an hour, or more, had elapsed.

child, aged four months, the saliva of dogs, their pancreatic juice and tissue, the parotid and pancreatic tissue of an adult pig, and the gastric juice of dogs which had been rendered alkaline by their swallowing the saliva, all induced the immediate formation of sugar in a solution of starch; but it was only in adult human saliva that the whole of the starch was so changed that iodine produced no blue tint with the mixture. With the other substances, the complete change was effected in various periods, the longest time being one hour. The saliva of a dog, excluding the parotid secretion, brought about this change in twenty minutes; mucus from the urinary bladder of a pig, in thirty minutes; pancreatic tissue of a dog ten days old, in forty minutes; tissue of the submaxillary gland of an adult pig, in an hour; hepatic tissue of the same animal, in an hour and twenty minutes; muscular coat of the bladder of the same animal in an hour and a half; tissue of the submaxillary gland of a dog ten days old, two hours and fifteen minutes; parotid tissue of the same animal, in three hours; acid gastric juice of dogs in which there were no buccal epithelium cells, in one hour and thirty minutes. Mucus from the mouth of a dog whose salivary ducts had been tied a fortnight before, aqueous extract of his detached buccal mucous membrane, his parotid and submaxillary tissue, gave traces of sugar after three or four hours, but the solution of starch remained thick and viscid. Traces of sugar were found eight hours after the parotid and submaxillary secretions were separately mixed with solution of starch. When the secretion of a dog's orbital gland was used, no trace of sugar was found after seven hours had elapsed; when saliva, from which the submaxillary secretion was excluded, was employed, no sugar was formed after two hours, and fifteen hours were sufficient to induce this change in starch subjected to the action of the acid gastric juice of a dog whose parotid and submaxillary ducts had both been tied.

The result of these inquiries, is, that *no one* of the secretions of the mouth, by itself, furnishes the peculiar ferment, but, that this has its source only in the admixture of the secretions.

To determine the relative importance of these different liquids, Jacubowitsch instituted several experiments. He tied the salivary ducts, and found, contrary to Bernard's statement, that the mucous secretion of the mouth could not change starch into sugar. When, however, the ducts of but a single pair of glands were tied, and starch digested in the secretion then obtained from the mouth, sugar

made its appearance in five minutes. The parotid and submaxillary secretions, however, when mixed, were deficient in this power.

Bidder and Schmidt found that parotid saliva, mixed with buccal mucus, exerts no marked action on the conversion of starch into sugar, while the sub-maxillary secretion mixed in the same manner, acted as promptly as common saliva. They agree with Bernard, in regarding the parotids as furnishing a secretion, simply designed to moisten the dry food, and the submaxillary forms with the buccal mucus the peculiar ferment of the saliva.

Another important result obtained by these observers, is the fact of the inactivity of these glands during infancy. Several experiments determined this point. 1. On establishing fistulous openings in Steno's ducts in calves, no fluid escaped through the canula. 2. Starch was converted into sugar in the presence of the tissue of the parotid glands of adults, in a far shorter time than when the same tissue of an infant's gland was used. 3. When the saliva of an adult man, and that of a child at the breast, were respectively mixed with equal parts of a thick solution of starch, the metamorphic action *commenced* in equally short spaces of time, but it was not *completed* in the child's saliva till a full hour had elapsed, whereas, in the man's, the action was over almost as soon as it had begun.

The necessity of alkalinity to the performances of the functions of the saliva is also considered, and it is ascertained, that this reaction is not, as Wright and Bernard supposed, essential to the function of this fluid. Acids, whether organic or inorganic, did not interfere with its action.

Jacubowitsch mixed a dog's pure filtered gastric juice, free from histological elements, neutralized by strongly alkaline filtered human saliva, with a fresh decoction of starch. He acidified another portion of the saliva with the same gastric juice. Both mixtures, after standing two hours at a temperature of 100° F., gave decided indications of sugar with Trommer's test.

He also took pure filtered gastric juice, and (1) mixed it with saliva to neutralization; (2,) made it alkaline by excess of saliva; (3,) made it alkaline by soda; (4,) acidified saliva with it; (5,) mixed it with starch. All these mixtures, except 3 and 5, when kept at a temperature of from 86° to 104°, showed distinct traces of sugar in fifteen minutes. Gastric juice, therefore, while it is

powerless of itself, does not deprive saliva of its saccharifying power. Bidder and Schmidt fully corroborate these statements.

In a question, however, which seems, at first sight, identical, they differ from Jacubowitsch. They failed to detect any sugar in the stomach, after starch had been introduced by an œsophagus tube or through a gastric fistula. Yet, when the gastric fluid is alkaline, in consequence of the quantity of saliva which the animal has swallowed, or when it exhibits large particles of frothy saliva, it occasions the immediate metamorphosis of the starch; while, when the gastric juice is acid, and little saliva is present, the change does not take place in less than an hour-and-a-half, and then but slightly.

There are but two ways of explaining this discrepancy. One is, that the sugar has been immediately converted into lactic acid, and so lost in the contents of the stomach. The other is, that it has been absorbed as fast as formed. Difficulties attend both explanations, but the latter is the more probable.

It must be stated, however, that other chemists do not agree with Bidder and Schmidt. Frerichs, "in at least fifty experiments," constantly found sugar in the stomachs of animals. Jacubowitsch fed a dog, suffering with gastric fistula, on starch, after twelve hours fasting. Four or five hours afterwards, sugar was always present. In another dog, whose salivary ducts had been tied, but in which all the other circumstances of the experiment were identical, no conversion of the starch into sugar, or even into dextrine took place.

Lehmann always found sugar in the stomachs of animals fed on starch.

In the other carbohydrates, saliva exerts no definite metamorphic influence. Cane sugar, gum, cellulose and bassorin, remain unchanged in the saliva; in certain species of sugar only, after long continued digestion, at a high temperature, formation first of lactic and then of butyric acid takes place.

In reference to the *sulphocyanide of potassium*, Kletzinsky found, that it retarded fermentation generally, and killed the low fungoid growths which result from it. In certain children, whose mouths contained fungous formations, the saliva was totally deficient in *sulphocyanides*.

18.—*Gastric Secretions.*—"Observers are pretty generally agreed that there are two distinct secretions in the stomach, the *gastric*

juice and the *gastric mucus.* The former is a clear, watery, or slightly viscid fluid, containing only a few accidental morphological elements, such as gastric cells and their nuclei, and a granular substance, resulting from the disintegration of these elements. It is only secreted during digestion, and it alone, of all the gastric fluids, possesses any digestive power. The latter accumulates in the stomach during the intervals of digestion. It is neutral in its reaction, and exerts no solvent power upon the protein-compounds.

Frerichs, however, states that, at the commencement of digestion, the round cells in the interior of the glands escape in excessive quantities, and form a stratum of about a line in thickness, which has hitherto been regarded as mucus, and which either invests the interior of the stomach or surrounds the contents in the form of a white membrane, the latter being especially the case when dry food is taken. The gastric cells become gradually disintegrated during the continuance of the digestive process, and thus afford a continuous source of pepsin or ferment. The digestive act being accomplished, the gastric glands collapse, and in that state no nuclei or cells, and only a few scattered granules, escape from them. During abstinence from food, the morphological elements are again perfectly formed, and the tubes become filled with cells, which, probably, in very prolonged fasting, again become disintegrated.

Kölliker has called attention to two facts connected with digestion. One is, that during this process, in many of the mammalia, *the gastric mucous membrane is covered with a more or less thick coat of mucus.* He has found this mucus constantly present in certain animals, while, in others, it is altogether absent, or present only in very small quantity. When present, it does not consist solely of gastric cells, and often, indeed, contains no trace of them. In the pig and rabbit it consisted chiefly of desquamated cylindrical epithelium.

The second fact is, that in many animals *the gastric glands occur in two different forms, and yield two different kinds of secretion.* One set of these glands is lined by cylindrical epithelium, the other set contains roundish cells. Goll found that the digestive powers of the fluids secreted by these two classes of glands, were widely different. Acidified mixtures, prepared from the glands with round cells, very rapidly dissolved coagulated protein-compounds, while those prepared from the glands with cylindrical epithelium, either exerted no action whatever, or only a very slight action, after a long period.

Köllicker's views are stated by Dr. Day as follows: "A very acid reaction is invariably observed in that part of the gastric mucous membrane in which the complicated glands lie, and the so-called pepsin must necessarily be situated here, since the mucous membrane of this part yields an energetic digestive fluid; indeed, it could hardly be presumed that pepsin was secreted by the glands lined with cylindrical epithelium, and the very slight effects which were occasionally observed to be slowly produced by the digestive fluid prepared from these glandular structures, were probably due to the presence of the nitrogenous matters which occur here, for all mucous membranes yield, with distilled water and a little acid, a fluid possessing *some* solvent power. The acid reaction exists in the whole stomach, and the more simple glands, which do not secrete pepsin, may possibly yield an acid juice; but the reaction is always weakest where merely the simple glands are situated. The glands with cylindrical epithelium give forth a secretion containing no visible objects, excepting a few epithelium cells from their upper part, while the true gastric glands, at all events, in certain animals, yield not only cylindrical, but also roundish cells. These latter cells, however, do not seem to be invariably present in gastric juice, and in many animals this secretion apparently contains no visible particles. There can be no question that it is these comparatively large, round cells, which secrete the pepsin, which either oozes through their walls, or is liberated by their solution.

19.—*Chemical Characters of Gastric Juice.*—Fresh gastric juice, even when the animals have been kept for twenty-four hours, or longer, without food, is never perfectly pure, but always contains hair, sand, remnants of food, &c. It often escapes from the canula in large drops, as a perfectly clear and limpid secretion, but the impurities soon reappear, and give color to the fluid. This color varies with that of the ingesta. In the dog, it is ash-grey; in the sheep, green or olive. The filtered fluid is always clear and transparent. The substances left on the filter, when examined microscopically, were found to consist of partially digested muscular fibre, fat, vegetable cells, &c. Epithelial cells are rarely found, but round corpuscles are there in abundance. These elements are merely accidental, as the gastric juice, when filtered, exerts an equally energetic solvent action upon the substances which are presented to it.

To determine the acidity of the gastric juice, these observers treated it with a normal solution of potash, containing 1 per cent. of potash. From nine experiments on a dog, after ligature of the salivary ducts, it appeared, that on an average, 100 parts of the juice were neutralized by 0.356 of potash; while in eleven, whose salivary ducts had not been tied, the average amount of potash required for neutralization, was 0.390 of potash to 100 of juice. This paradox is explained by the circumstances of the diet of the two sets of dogs, the first having been fed on albuminous, the latter on amylaceous food. There is, however, always very great variation in the acidity of this secretion.

The question of the particular acid on which this reaction depends, has also been taken up by these physiologists. It was originally, as is well known, regarded as hydrochloric acid. Lehmann, however, advanced the opinion, that lactic acid was the acidifying principle, and this was confirmed by quite a number of eminent physiological chemists. Hübbenet, however, Bidder and Schmidt and Graham, favor the old view. Schmidt not only discovered hydrochloric acid, but demonstrated most positively the absence of lactic acid in the cases on which he experimented. Lehmann, on re-examining the matter, repeats his former opinion, and distinctly shows the presence of lactic acid. So the matter stands at present. On both sides of the question are ranged men of the greatest distinction, and there can be no possible doubt that, in the distinct examinations they have made, their reports are correct. The only way of accounting for the discrepancy is, to suppose that both these acids are secreted by the gastric mucous membrane, though the causes which determine the separation of one in preference to the other, on any particular occasion, remain unknown.

Pepsin, the organic substance which exerts so powerful an influence over digestion, has been very carefully studied. It is precipitated by bichloride of mercury and acetate of lead, and is decomposed by anhydrous alcohol and a boiling heat. It may be separated from its mercurial and plumbeous compounds by sulphuretted hydrogen, and when obtained, it communicates to hydrochloric acid a powerful solvent influence upon albuminous matters.

Schmidt supposed that it formed, with hydrochloric acid, a conjugated acid, and still adheres to that view. He calls the active portion of the gastric juice *pepsin-hydrochloric* acid, and says, that it resembles ligno-sulphuric more than any other acid. Lehmann, however, gives good reasons for considering this position untenable.

The ultimate composition of pepsin, according to Schmidt, is, carbon 53.0, hydrogen 6.7, nitrogen 17.8 and oxygen 22.5.

The mean composition of gastric juice will be found in the following table. A is a mean of 9 experiments on the gastric juice of a dog, whose salivary ducts had been tied. B is a mean of 3 analyses of this fluid in a dog, whose salivary ducts had not been tied, and C is taken from two analyses of a sheep's gastric juice:

	Gastric Juice, (without saliva.) A.	Gastric Juice, (with saliva.) B.	Gastric Juice, sheep. C.
Water,	937.062	971.171	986.147
Solid residue,	26.938	28.829	13.853
	1000.000	1000.000	1000.000
Ferment or pepsin,	17.127	17.336	4.055
Hydrochloric acid,	3.050	2.377	1.234
Chloride of potassium,	1.125	1.073	1.518
Chloride of sodium,	2.507	3.147	4.369
" " ammonium,	0.468	0.537	0.473
" " calcium,	0.624	1.661	0.114
Phosphate of lime,	1.729	2.294	1.182
" " magnesia,	0.226	0.323	0.577
" " iron,	0.082	0.121	0.331

20.—*Action of Gastric Juice.*—Bidder and Schmidt have examined this subject under six distinct inquiries:

1. The part taken by the saliva in the gastric digestion of nitrogenous bodies.

2. The influence of a greater or less quantity of free acid in the gastric juice.

3. The action of neutralized or alkaline gastric juice.

4. The difference of the action of the filtered and unfiltered gastric juice, with the view of ascertaining the influence of the organic histological elements suspended in it.

5. The influence of greater or less dilution and concentration of the gastric juice on its solvent power.

6. The influence of heat, addition of bile, &c., on the digestive power of the fluids of the stomach.

The following results were obtained:

1. Saliva does not, as Wright supposed, assist in the digestion of albuminous matters. Indeed, more dry albumen was digested by dogs after ligature of the salivary ducts than before. The average of 27 experiments showed that the matters digested, when the salivary glands were tied, in two, four and nine hours, were 29, 62 and 76 per cent.; and when they were not tied, the averages of the same number of experiments for equal times, were only 26, 45 and 65 per cent. This difference, probably, depends upon the neutralization of the gastric juice by the alkaline saliva.

2. The acid gastric juice was shown to be the agent in digestion, and the difference between the times required for full solution in the stomach and out of it, depends upon the motions of the organ, bringing the food constantly in contact with fresh portions of gastric juice. Several of these experiments show that, provided a sufficient quantity be present, the digestive power of the gastric juice is directly proportioned to the quantity of free acid present. The neutral or alkaline gastric mucus of fasting animals, dissolved only very small quantities of albumen, but on adding hydrochloric acid, the activity of the fluid was at once augmented.

3. When the free acid is neutralized by potash, the digestive powers of the gastric juice are entirely destroyed.

4. The influence of filtration was by no means marked. They found that gastric juice, deprived of all its solid organic matters, was just as efficacious as that which had not been filtered. Frerich's view, however, differs from this. He thinks that new ferment is constantly developed by the action of the free acid from the cells contained in the gastric juice.

5. No definite results were obtained.

6. Rapid ebullition or evaporation at a boiling heat destroyed the solvent power of gastric juice. When, however, this fluid was frozen, its digestive power remained. Bile mixed with gastric juice completely destroyed its solvent power upon albumen, even while the fluid remained acid.

21.—*Quantity of Gastric Juice.*—Bidder and Schmidt found that dogs secrete, in twenty-four hours, an amount of gastric juice equal to one-tenth the weight of the body. If the same relation exists in man between the entire weight and the amount of this fluid, a man of ordinary weight would secrete from 14 to 17 pounds. Lehmann's estimate differs from this. The following are his data:

100 grammes of the fresh gastric juice of a dog cannot, (according to his experiments,) dissolve more than 5 grammes of coagulated albumen, calculated as dry.

An adult man receives into the stomach about 100 grammes of dry albuminous matter in twenty-four hours.

Hence, to digest this quantity, there must be secreted 2000 grammes, or 4 pounds of gastric juice.

Bidder and Schmidt's estimate of the amount of solid albumen which 100 grammes of gastric juice will dissolve, is much lower than Lehmann's. Their maximum is but 3.95, less than Lehmnan's minimum, which is 4.317. His maximum is 6.14. Their average, (a mean of twenty-seven experiments,) is 2.2.

They attach great importance to the extraordinary amount of this very aqueous secretion. It so dilutes the dissolved nutriment "that it is enabled to enter into endosmotic relations with the blood circulating in the intestinal walls, and even with the chyle in the lacteals. Hence, within certain limits, the quantity of secreted gastric juice must be greater, the less fluid is directly introduced into the stomach as drink."

22.—*Bile.*—Their first inquiry was, whether the bile was an excretion or not?

This they have not positively determined. They found, in several instances, that the animal gradually lost health and strength, and finally died, after the passage of bile into the intestine had been prevented. Where the spleen was tied, the decline of health and strength was more rapid. In one case, however, in which the spleen was not tied, an emaciated dog, with a biliary fistula, recovered his health and strength. He ate, however, more food than was natural to him in an unmutilated state. The ductus communis choledochus subsequently became re-established, and then he rapidly increased in weight. In those animals which died, there was a manifest tendency of the contents of the bowels to putrefaction, but the most marked change was the gradual disappearance of the fat, the muscles remaining in their ordinary condition.

23.—*Quantity of Biliary Secretion.*—The amount of bile secreted varies greatly in different animals. The following table exhibits

this, by showing the amount for each kilogramme of weight, in different animals:

	Cats.	Dogs.	Sheep.	Rabbits.	Geese.	Rooks.
Fresh bile,	14.500	19.990	25.416	136.84	11.784	72.096
Dried residue,	0.816	0.988	1.344	2.47	0.816	5.256

Of course no inference can be drawn from these experiments as to the quantity secreted by man. Bidder and Schmidt think it probable that an adult man secretes daily a kilogramme and a half, about 54 ounces,) containing 5 per cent. of solid constituents.

They found that the secretion was increased during digestion. It reached its maximum 13 or 14 hours after eating. In prolonged starvation it gradually and progressively diminishes.

Nasse showed that the *nature of the food* exerts an influence over this secretion. A flesh-diet induces a far more abundant secretion than amylaceous food. Thus, a dog fed on bread and potatoes, secreted daily 171.8 grammes of bile, containing 62.52 grammes of solid matters; but, when kept on a flesh-diet, secreted in the same period, 208.5 grammes of bile, containing 70.6 grammes of solid matters. Bidder and Schmidt found that in cats, fed on fatty matters exclusively, the secretion of bile was as much diminished as though they had fasted the same length of time.

Nasse found that large doses of carbonate of soda very much diminished the secretion of bile, especially of its solid constituents, while calomel augmented the quantity of fluid bile, but caused a diminution of its solid constituents. All of these observers found that, during fever, the amount of this secretion was always diminished.

Pure bile is always clear, epithelium being only found in it during catarrh. Pure yellow bile may be rendered green by oxygen, and green bile may be made yellow by deoxydation. In the gall-bladder, the bile is changed in color and gets purer in water and fuller of mucus. Thus, when the fresh bile of animals contained, on an average, 5 per cent. of solid constituents, that in the gall-bladder contained as much as 10 or 20 per cent.

The reaction of pure bile is always neutral. When mixed with the mucus of the gall-bladder, it becomes alkaline, and when decomposed, it sometimes develops free acid.

The question of the *resorption* of bile was also examined. A dog was fed on black bread, then on flesh, then on black bread again. So different were the fæces produced by these two sorts of diet, that the kind of food could be easily determined by an in-

spection of the dejections. During the flesh-diet, but little bile could be detected in the fæces. This proximate analysis was confirmed by a determination of the elements, little sulphur being found in these stools. These observers are, therefore, led to conclude, contrary to the opinions of Mulder and Frerichs, that by far the greatest portion of the solid biliary matter, probably seven-eighths, is returned into the mass of the juices.

The *antiseptic* properties of bile were shown by the great putridity of nitrogenous, and the excessive acid fermentation of amylaceous food. Hünefeld's statement, that bile free from mucus digests blood-corpuscles, but that normal bile possesses no such power, is confirmed by these observers. They also show that bile exerts no influence over the digestion of albuminous or amylaceous ingesta.

In regard to its influence on the *resorption of fat*, they found that though fat might be taken up when there is no bile in the intestine, yet the presence of that secretion greatly facilitates this action. The chyle also is found to be relatively poor in fat, after ligature of the ductus communis choledochus. Bile seems to render the intestinal membrane more permeable to fat. Oil rises higher in a capillary tube, moistened with bile, than in a similar tube, not wet with this secretion.

These experiments appear to show that bile is not, at any rate, a very active digestive fluid. The length of time after food, at which this secretion reaches its maximum, is too great for it to exert much influence over chylification.

Bidder and Schmidt think that its principal object is "to prolong the series of changes to which animal matter is subjected in the organism, and thus to render it for a longer time efficient in the discharge of vital processes," in short, to economize animal tissue.

24.—*Pancreatic Juice.*—This fluid is a clear, limpid, colorless, transparent, viscid and ropy fluid, containing no microscopical particles. It has a strong alkaline reaction, and on the addition of 85 per cent. alcohol, is coagulated into a milky mass, which deposits thick white flakes, above which is a clear, colorless, strongly alkaline alcoholic solution. The flakes, when collected by filtration, washed with alcohol and dried, may be, for the most part, redissolved in water, and then they constitute a solution resembling the original secretion. Strongly heated, they leave a small residue of carbonate of lime. The alcoholic solution, when evaporated, leaves a colorless albuminate.

According to Schmidt, its specific gravity is 1.031, while, according to Lehmann, it ranges from 1.008 to 1.009. The following are the analyses of the fluid:

Pancreatic Juice of the Ass, (Frerich's.)

Water, ...		986.40
Solid residue,		
Fat, ...	0.26	
Alcohol extract, . . .	0.15	
Water extract, . . .	3.09	
Soluble salts, ...	8.90	
Insoluble salts, . . .	1.20	
		13.60
		1000.00

Pancreatic Juice of Dog, (Schmidt.)

Water, ...		900.76
Solid residue,		
Organic matter, . . .	90.38	
Inorganic constituents, .	8.86	
		99.24
		1000.00

In another case, Schmidt found that the solid matters in 1000 parts amounted to 115.6.

The water extract of Frerichs, or the organic matter of Schmidt, resembles albumen and casein in many of its properties, but is not identical with albuminate of soda, casein or ptyalin.

The *quantity* secreted is unknown. Bidder and Schmidt think, that for every kilogramme of weight, a dog secretes 0.10 of a gramme, and over. According to this, a man weighing 64 kilogrammes (about 140 pounds,) would secrete, in twenty-four hours, 150 grammes of pancreatic juice, yielding 15 grammes of solid residue.

Weinmann, who has been also experimenting on this subject, obtains results which differ from these. He found that a dog secreted 35.184 grammes to every kilogramme of weight.* The secretion is at its minimum after long fasting, and at its maximum

*According to this, a common sized man would secrete 11½ pounds in twenty-four hours.

after food, especially after water. The proportion of solids does not appear to vary so widely as the secretion itself.

During fasting, the gland is pale and anæmic, but during digestion, it becomes highly vascular and turgescent, and yields a copious secretion.

They prove that the fluid exerts no influence over the digestion of albuminous substances, but has a powerful saccharifying action on starch. They consider it more energetic in this respect than saliva. The substance upon which this action depends, exists ready formed, in the pancreatic juice, and retains its energy even after that fluid has stood for twenty-four hours at a temperature of 64°. The action is not arrested by gastric juice or bile.

The *digestive power* of this fluid on fats has been variously stated. That the fatty acids are not liberated from their bases, as the Germans generally have understood Bernard to declare, no one can now doubt. This change, however, takes place readily out of the body. Lenz has shown that the acid gastric juice is the impediment to this metamorphic action within the body.

It must be confessed that much doubt still overhangs this whole subject. But little light is cast upon it by the pathological fact of the occasional discharge of fatty matters from the intestines. This was formerly thought, by Dr. Bright, to depend upon pancreatic disease. Since Bernard's discoveries, this opinion of Dr. Bright's has gained ground among physicians, but it so happens that the distinguished author of it has abandoned it as a too hasty inference. Various lesions have been found to accompany this symptom, so that pathology leaves us just where physiology does, still very much in the dark.

25.—*Intestinal Juice.*—Much diversity of opinion, in regard to this matter, exists among authors. All that can be certainly affirmed with regard to it, is that, after filtration, it is colorless, tenacious and ropy, with a strong alkaline reaction.

Frerichs found that it effected no change in protein-compounds or gelatigenous substances, disintegrated fat only, as all viscid fluids do, and exerted no special influence over starch. Hence, he does not regard this substance as a special digestive agent.

Lehmann, however, found that it possessed, in a high degree, the power of converting starch into sugar, but that fats and protein bodies were scarcely, if at all, affected by it.

Zander and Bidder and Schmidt, on the other hand, find, as the result of experiments on nineteen cats and two dogs, that the intestinal juice digests albuminous bodies almost as well as the gastric secretion, and that its saccharifying power over starch nearly equals that of saliva or pancreatic juice.

MISCELLANEOUS ORGANIC CHEMISTRY.

26.—*Chloroform.*—Professor Horsford, of Cambridge, read, at the last meeting of the American Association for the advancement of Science, an article on the fatal effects of chloroform.

It will be remembered, that Dr. Charles T. Jackson, some time since, made a great outcry about fusel oil, to which he attributed the deaths occurring after the administration of chloroform. This oil is always present in badly rectified whiskey, and is also to be found in poor specimens of alcohol. It was supposed that the deadly chloroforms were made from this whiskey or the impure alcohol, that the fusel oil formed with the bleaching salt a volatile compound which passed over, contaminated the chloroform and communicated to it poisonous properties. This subject has been examined by Prof. Horsford, and he has communicated his results in the article before us. Another hypothesis was, that chloroform was susceptible of spontaneous change, which unfitted it for use as an anæsthetic.

Chloroform was sold, some of which was impossible to be inhaled, by reason of the presence of free chlorine and hydrochloric acid, and other samples yielded an offensive and putrid odor.

The bad chloroform examined by Prof. Horsford, was yellowish-green, as was the air above it in the bottle. Floating on its surface was a thin layer of deep yellow, oily matter. The whole smelt strongly of chlorine.

A quantity of this liquid, inverted in a test-glass over mercury, evolved gases, at first greenish and afterwards colorless, which gradually forced down the chloroform, till, after nine months, several cubic inches of gas were formed from a cubic inch of the liquid. It was easily purified by soda-lime, and by placing it, for a few days, in contact with candle-wick.

The oil was examined for sulphur and nitrogen, and gave a negative result.

Chloroform was then manufactured with alcohol containing fusel oil, in varying proportions, but in every case the resulting chloroform was good. Pure fusel oil was then treated with water and bleaching salt, in the same manner as alcohol in the manufacture of chloroform, and a product was obtained resembling fusel oil in smell, but having a different specific gravity. This varied from 0.8224 to 0.8236, while that of pure fusel oil is 0.8124. It contained 1.35 per cent. of chlorine, which was due to the chloroform derived from the trace of alcohol present in the fusel oil. Alcohol containing impure methyl alcohol (wood spirit) gave good chloroform.

Experiments were made with the distillate obtained from fusel oil, water, and bleaching salt, to determine its effects upon the economy. The result was, that after a protracted application of the agent, a very slight lethargic state was induced, from which, however, the animals speedily and perfectly recovered.

Above fifty different preparations of chloroform were made, from which, together with the above experiments, the Professor deduces the following conclusions:

"1st. That good chloroform does not spontaneously change in a period of nine months.

"2d. That the bad chloroform, containing free chlorine and hydrochloric acid, may be produced by using a bleaching salt of great strength, with a quantity of alcohol disproportionately small.

"3d. That the bad chloroform may be produced by receiving the distillate into water, so as immediately to withdraw the alcohol from the chloroform.

"4th. That bad chloroform may be produced by passing chlorine directly into chloroform.

"5th. That no formula for its manufacture can be relied upon as a guide, since bleaching salts vary in strength when derived from different factories, and vary with age. In the foregoing experiments, the range is 15 to 30 per cent.

"6th. That quick lime added to the mixture does not promote the economy of manufacture.

"7th. That the chlorine and hydrochloric acid of bad chloroform, as observed by Dr. Dwight, may be removed by agitation with a little alcohol.

"8th. That the ill effects observed in the administration of chloroform, are not due to the presence of chlorine, as the irritation is such, when it is attempted to inhale it, as to prevent inhalation altogether.

"9th. That the ill effects are not due to any poisonous product arising from the action of bleaching salt on the small quantity of fusel oil, in the alcohol employed in the manufacture of chloroform.

"10th. That the ill effects are due to peculiarities of constitution or temperament of some patients, and in a few rare cases, to want of attention or judgment on the part of the person administering it."

[The result of the whole is, that we know nothing positive, as yet, of the counter-indications to the administration of this anæsthetic. There is danger in its use, and we cannot, as yet, determine where that danger lurks, or on what it depends.]

12.—*Fusel Oil.*—The Journ alof the Franklin Institute, for June, publishes a memoir by Dr. Charles H. Wetherill upon this oil, which has acquired new interest since Dr. Jackson, of Boston, has attempted to account for the occasional poisonous properties of chloroform by its supposed presence in the noxious drug.

This oil, as is well known, was first obtained by Scheele from fermented potatoes, and examined carefully by Dumas, Pelletan and Cahours, to the last of whom we are principally indebted for what we know about it. It always contains amylic alcohol and has been described as synonymous with that substance.

The common oil, however, contains a variety of other substances. Mulder detected in it ænanthic, Kolbe, margaric, and Rowney, capric acid. Kent found in it acetic and valerianic acids and an ether, the acid of which was not isolated.

Wurtz isolated from it butylic alcohol.

Wetherill detected acetic and caprylic acids, and oil of turpentine, which was probably an accidental contamination. He obtained indications also of the presence of formic, caproic and ænanthic acids.

13.—*Organic Poisons.*—M. C. Flandin has published a memoir in the *Comptes Rendus* in which he proposes a new method of testing for the organic poisons.

He mixes 12 parts of anhydrous lime or baryta with 100 of the substance to be examined, pounds them together in a mortar, heats the mixture to 212°, pulverizes again, and treats the powder three times with boiling anhydrous alcohol. He filters the liquid, which

passes through colorless, and contains nothing but the proximate principle, mixed with fatty or resinous matters. The alcohol is now slowly evaporated, and the dry residue treated with ether to remove the fats. If the principle be insoluble in ether, it is easily obtained by filtration or decantation. If soluble in that menstruum, it must be dissolved by some special substance, as acetic acid, and precipitated with ammonia.

M. Flandin has made several experiments to test the accuracy of this process, and has succeeded in obtaining a cognizable amount of these poisons from admixtures of minute quantities of them with animal matters. In one instance he mixed 10 centigrammes of morphia with 100 grammes of flesh, and obtained several centigrammes of morphia from the mass after several months putrefaction.

14.—*Tobacco.*—The Lancet is publishing a series of papers on the weed, which contains very full information upon some subjects connected with its growth, manufacture, chemical composition and adulterations.

Vauquelin found in it, nicotina; albumen; red matter soluble in alcohol and water; acetic acid; supermalate of lime; chlorophyll; nitrate of potash and chloride of potassium; sal ammoniac, and water. The leaves contained also woody fibre, oxalate and phosphate of lime, oxyd of iron and silica.

Conwell found in it gum; mucilage soluble in both water and alcohol; tannin; gallic acid; chlorophyll; green pulverulent matter, soluble in boiling water; yellow oil, having the odor, taste and poisonous properties of tobacco; pale yellow resin in large quantity; nicotina; a substance analogous to morphia; an orange red coloring matter; nicotianin.

Posselt and Reinman have made a quantitative analysis of the fresh leaves, which we copy:

Nicotina,	0.060
Concrete volatile oil,	0.010
Bitter extractive,	2.870
Gum with malate of lime,	1.740
Chlorophyll,	0.267
Albumen and gluten,	1.308
Malic acid,	0.510
Lignin and a trace of starch,	4.969

Salts, (sulphate, nitrate and malate of potash, chloride of potassium, phosphate and malate of lime, and malate of ammonia,)	0.734
Silica, ...	0.088
Water, ...	88.280
	100.836

The most important of these constituents are *nicotina* and *nicotianin.*

Nicotina is found not only in the leaves, but in the roots, seeds and smoke of tobacco. It is obtained by digesting an aqueous extract of the leaves in rectified spirit, which takes up the nicotine in combination. The tincture is concentrated and decomposed with potash. This sets free the nicotine which may be taken up again with ether. To purify it, oxalic acid is added to the ethereal solution; the precipitate of oxalate of nicotine which falls, is repeatedly agitated with ether, and again decomposed by potash and ether. The ethereal solution is now distilled in a salt-water bath, transferred to a retort, through which a current of dry hydrogen gas is made to circulate, heated in an oil bath, first to 284° F., to get rid of water, ether and ammonia, and then to 356° F., to distil over the nicotine. This process easily gives 4 per cent. from Virginia tobacco.

It is a colorless liquid, with an acrid odor and an acrid, burning taste. It boils, and is decomposed at 482° F., becomes brown on exposure to the air, and readily burns with the aid of a wick. It is soluble in water, ether, alcohol and the oils. With the acids, it forms salts which are usually very acrid, crystallizable, and have the taste and smell of tobacco. Chloride of mercury (corrosive sublimate) throws down a white flocculent precipitate, and bichloride of platinum a yellow granular one, from solutions of nicotina.

Nicotianin, the concrete volatile oil of tobacco, is obtained by distillation. Six pounds of the leaves yield eleven grains of oil. It has the odor of tobacco and a bitter taste. It produces in the throat a sensation similar to that excited by tobacco smoke. Applied to the nostrils, it causes sneezing. Helmstädt swallowed a grain of it, which produced nausea, giddiness, and an inclination to vomit.

Tobacco smoke has been analyzed by Raab, Unverdorben, Zeise and Melseur.

Raab found in it, carbonate of ammonia; acetate of ammonia;

nicotianin; empyreumatic oil; carbonaceous matter; moisture and several gases.

Unverdorben obtained, by dry distillation, a volatile oil; an oleaginous acid; an empyreumatic acid; resin; traces of a powder insoluble in potash and acids; odorin, a small quantity; a base soluble in water, (nicotine?); fusein; red matter soluble in acids; and two extractive matters, one forming a soluble, the other an insoluble compound with lime.

Zeise detected a peculiar empyreumatic oil; butyric acid; carbonic acid; ammonia; paraffine; empyreumatic resin; water; acetic acid; carbonic oxyd; and carburetted hydrogen.

Melsens found nicotina in tobacco smoke.

It is evident from these analyses, that the notion of tobacco preserving the teeth, at any rate when smoked, is an extremely erroneous one. The smoker brings in contact with his teeth, at a high temperature, acids which cannot fail to attack the phosphate of lime which forms their principal mineral basis.

15.—*Nicotin.*—We find in the *St. Louis Medical and Surgical Journal*, for March, a translation from the *Prager Vierteljahresschrift*, which contains some important additional information in reference to this agent, chiefly in regard to its physiological action.

Albers, of Bonn, has instituted a series of experiments to compare this poison with hydrocyanic acid. The latter stupifies in 30-45 seconds, and does not produce its final action till after 30-60 seconds. Nicotin manifests its action in 10-15 seconds, and completes it in 15-35 seconds. It is therefore much more rapid in its operation than hydrocyanic acid. This seems to have some bearing on the theory of nervous transmission of therapeutical or toxic impressions. According to Black's experiments, the shortest time in which a remedy can enter the blood, is three-quarters to one-and-a-quarter minutes.

Secondly, The action of nicotin, short as it is, is always very painful. "As soon as the poison touched the tongue, the rabbit began to cry and even more continually, than Albers has ever heard it in dissecting a nerve; it is known, however, that these animals do not cry but in the highest degree of pain. There was found on that part of the tongue, upon which the drop of nicotin had fallen, a yellow spot, and the smell of nicotin.

Thirdly, The nicotin acts upon the entire motor apparatus, the superior as well as the inferior. The difficult respiration, attendant on poisoning by prussic acid, was absent in cases of death from nicotin. Nicotin paralyzes the motions, but does not affect the sphincters, the bladder having been found filled with urine, after death by it. In frogs, the action of nicotin differs still further from that of prussic acid, which paralyzes the anterior extremities first. This recalls Flourens' assertion that the motor power over the anterior extremities resides in a portion of the nervous axis different from that which presides over the movements of the posterior limbs.

Fourthly, However speedily these agents kill, the animal irritability lasts long after the heat has ceased to beat. The muscles have contracted twenty-five minutes after the cessation of respiration.

Vandercorput, of Brussels, has instituted experiments with nicotin, which had been kept two years. The smallest quantity of it, put into the mouth caused a burning sensation resembling a severe laceration, and communicated the taste of a cigar moistened with saliva. In the pure alkaloid the smell is feeble, but is easily developed by the addition of caustic ammonia. Four drops of nicotin put in the mouth of a large dog killed him in less than a minute. He made a few leaps, and fell on the left side. Acetic acid was immediately applied, but failed to restore him. A drop in the eye of a pigeon killed the bird almost instantaneously. The legs were spasmodically extended and it fell on the left side. The corner of the poisoned eye was slightly opaque and its pupil normal, while that of the other eye was dilated.

According to Albers, birds die most rapidly, while a frog after receiving a drop of nicotin lived more than two minutes. Another frog, which got a dose of nicotin mixed with acetic acid, did not appear at all affected; the application of a little caustic potash, however, immediately caused convulsions of the posterior extremities and death followed instantaneously.

Vleminckx, of Brussels, has experimented upon two guinea-pigs, a cock, two dogs and a cat, and the following are his conclusions:

1st. The poisoned animals fall sometimes on the right, sometimes on the left side.

2d. The poison is more active applied to the eye than to the mouth.

3d. The most constant symptoms are congestion of the *pia mater* and the lungs.

Albers could not confirm the statement of congestion of the lungs.

BIBLIOGRAPHICAL.

Bull on the Maternal Management of Children. Philadelphia. Lindsay & Blakiston, 1853.

This valuable manual is now presented to us in a second edition, which, the preface tells us, is much improved, several of the chapters having been entirely re-written.

The book has been so long before the public that it is hardly necessary for us to say any thing about it. The importance to mothers, of such knowledge as is contained in it, cannot be overrated. So many children are destroyed by imprudence and ignorant, injudicious indulgence, that any treatise expounding to mothers the laws of the human frame and the hygienic management of this tender age cannot come amiss. Physiological knowledge of all kinds should be more widely diffused among the people. We should then have less quackery, less silly tampering with disease, a lower rate of mortality and more general physical comfort than we can now boast of. Nine-tenths of the mischief done by shallow books, and all the quackery that is in the world, can be traced to men's gross ignorance of the laws of their own existence.

These remarks are applicable with additional emphasis to the management of children. They are cast entirely upon our care, and we should be particularly zealous in faithfully discharging the duty which we have not wholly taken upon ourselves, which men have not thrust upon us, but which Almighty God, in his providence, has made incumbent upon us.

We, therefore, hail all such books as these as benefits to the world. There are many unintentional Herods in the nineteenth century, and many an Innocent's day which is not recorded in the calendar of any church. There is also but one way to put a stop to this squandering of young lives, to arrest this perpetual peregrination of the hateful little white hearse through our streets. It is by educating the masses in their duties to children, in the peculiar bodily habits of the little creatures, in the powerful influence of slight causes upon their tender frames.

This book, to a considerable extent, supplies this information; therefore we recommend it. There is, however, a strong temptation presented to the physician who gets up any thing of the kind, to write a treatise upon domestic medicine. The author of this little book has manifestly felt this temptation, and has yielded to it so far as to give a brief description of several childish ailments. We doubt the discreetness of such a course.

It is likely to torment an anxious, loving mother with many unnecessary disquietudes. It keeps her perpetually on the look out for symptoms of formidable diseases, in her little Eliza Jane or Augustus Frederick. It makes her fidgety and restless and fills her with dire apprehensions, and just in this proportion, it embarrasses the family physician, who cannot possibly keep pace with the mother's concern. The folly, however, of attempting to teach people to prescribe by the book is very generally avoided.

A few practical hints on poisons and their antidotes have been very judiciously introduced. Children have, as every observer of their habits knows, a terrible proclivity to put things of all sorts, from the spout of a tea kettle, full of boiling water, down to a painted toy, in their mouths, and it is not always possible for the most prudent and judicious *materfamilias* to keep noxious matters always out of the way. It is, therefore, very well for her to know what to do in cases of sudden emergency when medical aid cannot be immediately obtained.

The Microscopist; or a Complete Manual on the Use of the Microscopes for Physicians, Students, and all lovers of Natural Science. (Second edition, improved and enlarged.) By Joseph Wythes, M. D. Philadelphia. Lindsay & Blakiston, 1853.

The multiplication of works on the subject of microscopy is a cheering symptom. It shows that the minds of men are becoming gradually convinced of the great importance of this mode of interrogating nature. Originally a mere toy, the microscope has become a most valuable and indispensable means of research. By its aid, modern physiology is what it is. Even chemistry calls it to its assistance when it would unravel some problem of peculiar intricacy, or search for some deep and abstruse fact. The suspicion, with which the anatomists of the olden school regarded the instrument, is now gradually passing away, and a very general and increasing confidence in its teachings fills the mind of the profession.

The time is rapidly approaching when the microscope will be as necessary a portion of every physician's outfit as his pocket-case is now. Already it is a valuable means of diagnosis. No man in his senses, we presume, would pretend to treat an obscure case of urinary disease without first learning the microscopical characters of the urine.

In medico-legal investigations, it is also becoming important. In testing for arsenic, absolute certainty is now commonly attained by driving up and down the combustion tube the arsenical stain, till it is oxydated to arsenious acid, recognized by its octabedral crystals, when examined microscopically. In a recent trial, it became necessary to determine whether certain hairs on a hatchet were human or not. The microscope decided that they belonged to an animal, and so saved the life of a suspected murderer.

The little volume before us is an admirable hand-book for the beginner, who would commence the use of this valuable instrument. It contains a brief account of the optical principles on which the microscope is constructed, and of the different methods of applying those. Sketches and descriptions of compound simple and dissecting microscopes are given, while the various adjuncts are described and figured, and their uses pointed out.

Some pains is taken to inform the student how he may best procure microscopic objects, and under this, excellent directions are given for obtaining the rarer infusoria. Instructions are also given in mounting and preserving objects, and Goadby's excellent method is described somewhat in detail. The methods of making sections, minute injections, &c., are also mentioned, and the important subject of polarized light is not forgotten. Plans of polariscopes are given, and their attachment to the microscope is described.

In short, it is an excellent manual, and the numerous accurate cuts, with which it is filled, add greatly to its value.

A Text Book of Anatomy and Guide in Dissections, for the use of Students of Medicine and Dental Surgery. By W. R. Handy, M. D., Professor of Anatomy, in the Baltimore Dental College. Philadelphia, Lindsay & Blakiston, 1853.

Anatomical works are poured forth from the press in great abundance, and yet, a few favorites still keep possession of the field. A new candidate for public favor must, therefore, come before the world with something peculiar to recommend it, or it cannot claim the notice of a profession already so abundantly provided.

Professor Handy's work does possess these peculiarities. He has cast it in an entirely new and original mould. He has observed the same order in it which he follows in his lectures. He does not, for example, take up first the bones of the body and finish them, then the ligaments of the whole body, and finish them—then the muscles of the entire frame, and finish them, and so on through the catalogue, continually severing those things which nature has put together. On the contrary, he studies a part as it is, the bones of it first, of course, because they are its basis, then its ligaments and so on, till the whole part has been completely examined. In this manner, the student gets a clear and connected idea of what his teacher means that he shall learn, instead of being compelled to go over the whole field of anatomy and pick up the scattered facts, laboriously to combine the disjointed fragments in one entire and intelligible system, as Isis rambled over the world after the mangled and dispersed remains of the body of Osiris.

Dr. Handy, not only studies every individual part in all the relations of its elements, but he also dwells particularly upon the relations, anatomical and physiological of the part with neighboring organs and with the entire frame. Thus, a clear, connected, and natural system of teaching is arrived at, instead of the eminently artificial method commonly pursued.

He begins with what he calls the *alphabet of anatomy,* that is, the primary tissues of the body. Having studied these, he commences with the mouth, and follows the physiological course of the food in his demonstration. The extremities not having any direct relation to these functions, are described by themselves. We are satisfied, that a student will learn more that is valuable from this method, than from any other with which we are acquainted.

The book is copiously illustrated. Many of the cuts are entirely new in this country. We heartily commend it to both the medical and dental professions, as a thorough, faithful and physiological disquisition on anatomy.

On the Loss of the Teeth, and on the Best Means of Restoring them; with a New and Improved Method of Fastening Loose Teeth. By Thomas Howard, Surgeon Dentist to his Grace, the Archbishop of Canterbury. London.—(No date.)

We hope his Grace, the Archbishop of Canterbury, will endeavor to spare time from what devolves upon him daily, "the care of all the churches," to bestow a little attention upon the morals of his surgeon dentist. A few homilies to illustrate the maxim that "honesty is the best policy," would certainly be appropriate and might be beneficial. Considerably more than one-half of the surgeon dentist's book is taken word for word from Bell, without one syllable of acknowledgment, or the slightest mark that it came from any source but Mr. Howard's own brain.

Besides this capital defect of dishonesty, the book has a marvellously quackish savor. In one place, the dentist tells us, that he has "important reasons" for adopting a certain line of conduct. He hints that he has peculiar methods of operating, &c. In short, the book is an advertisement.

The American Journal of Science and Arts, for September.

This highly esteemed and oldest of the American Scientific Journals, so far from falling off, has gone on steadily increasing in interest and usefulness.

In the present number, we notice another accession to the able corps of editors who have hitherto had it in charge. Dr. Waldo I. Burnett, of

Boston, and Professor Louis Agassiz, of Cambridge, are now regular editors of the Journal. The former gentleman has become favorably known to the scientific world, by a number of valuable anatomical papers. The renown of the latter is world-wide, and he needs no introduction to any one who has the slightest smattering of natural history. Profoundly learned in every department of zoology and paleontology, he is the greatest living authority in ichthyology. He is engaged now in a work on the fishes of the United States, which will, undoubtedly, be the fullest and most satisfactory account of the subject that has ever appeared.

We know of no Journal which can boast of so distinguished a corps of editors. Every one of them is eminent in his particular department. Nor must we omit to mention the admirable Parisian correspondent of the Journal, M. J. Nicklés, whose letters contain an abstract of all the most important scientific news of the French capital.

Some idea may be formed of the variety of information contained in this Journal, by the following list of the contents of the present number:

On an isothermal oceanic chart, illustrating the geographical distribution of marine animals, by Dana; Contributions to mineralogy, by Genth; Hassler's experiments on the expansion of water, at various temperatures, by Alexander; Biography of Berzelius, by Rose; Artificial formation of minerals, by Marsoss; Probable number of the native Indian population of British America, by Lefroy; Constitution of some mineral species, by Hunt; Expenditure of heat in the hot air engine, by Barnard; Crystallized carbonate of lanthanum, by Blake; The normal of curvature, by Whitlock; Modification of the Ericsson engine, by Barnard; Parasitisn of comandra umbellata, by Gray; Reviews and abstracts in anatomy and physiology, by Burnett; Correspondence of M. J. Nicklés, containing researches in dying, pisciculture, carbonizing of wood by over-heated steam; Anæsthetic properties of lycoperdon, chloroformization, composition of water, extract of soils, photography, manufacture of sugar, &c.; together with a very full abstract of scientific intelligence in all departments.

A Treatise on Operative Ophthalmic Surgery. By H. Haynes Walton, Fellow of the Royal College of Surgeons, &c. First American from the First London Edition. Edited by S. Littell, M. D., Surgeon to Will's Hospital, &c. Philadelphia, Lindsay & Blakiston, 1853.

This is an excellent work on the subject. It is evidently the production of a man who has seen many cases of disease, and gathered from them much experience. He is thoroughly practical in his views, and in his mode of stating them. He does not confine himself to a mere operative surgery of the eye, but runs off now and then to the consideration of some

points in the pathology and therapeutics of that delicate organ. His readers, however, by no means regret these little digressions, for they abound in valuable practical hints, and are characterized throughout by sound good sense, and thorough acquaintance with the subject.

The book is gotten up in admirable style. The paper is clear, white and heavy, and the type so clear that it is a luxury to read it. The cuts are by Gihon, and are beautifully executed. The mechanical management of the book leaves nothing to be desired.

Chemistry and Metallurgy as Applied to the Study and Practice of Dental Surgery. By A. Snowden Piggot, M. D., etc. Philadelphia. Lindsay & Blakiston, 1853.

In a former number of the Journal, the senior editor announced that Professor Piggot was engaged in writing a work on Chemistry and Metallurgy, as applied to Dentistry. He now has the pleasure of informing his readers that it will be published in a few days, by Messrs. Lindsay & Blakiston, Philadelphia. He has had an opportunity of examining most of the sheets, and from what he has seen, he has no hesitation in saying, that the work is admirably adapted to the wants of the dentist. It is well written, and has only to be read to be appreciated. Indeed, it fills a hiatus which has always existed in the literature of dental surgery.

The importance of a knowledge of chemistry and metallurgy to the dentist, is now so universally acknowledged, that no argument is necessary to establish the fact. This knowledge will be supplied in the fullest and most complete manner, by the work under consideration, and indispensable and valuable as it will prove to be to the dentist, it may be read with equal profit by the student and practitioner of general medicine.

The work is divided into four books. The *first* is an outline of organic chemistry. It contains an account, first, of the ultimate, and then of the proximate elements of the body; taking up first, the protein compounds, then the organic acids and bases in regular order. *Book second* contains an account of digestion, first in the stomach, and then in the intestines. It includes, of course, the chemistry of the gastric juice, the bile, the pancreatic fluid, the intestinal juice, the fæces and vomited matters.

Book third contains the chemistry of the mouth. This includes the the chemistry of saliva, healthy and morbid; the chemistry of the teeth, of mucus and of salivary calculus, as far as known.

Book fourth treats of the chemistry and metallurgy of metals and the earths used in the manufacture of porcelain teeth. It contains, first, an account of the various methods of applying heat, the construction of fur-

naces, crucibles, lutes, measurement of heat, and full tables of fuel, showing the economy of the different varieties. Secondly, the metals—bestowing particular attention on gold and silver. Very full tables of coins of these two metals are given, so that the mechanical dentist can be perfectly sure of the exact composition of his alloy. Thirdly, the earths and alkalies, the structure of porcelain, the method of preparing the materials and the mode of making and coloring artificial teeth.

The foregoing is but a very imperfect outline of the plan of the work. Time and want of space prevent us from entering into detail. H.

Observations on the Disease and Loss of the Teeth, and the various means of supplying their Deficiency; and on Defects in the Palate, and their Treatment. By ALFRED BARON JONES, Surgeon Dentist; Member of the Royal College of Surgeons, in England. 8vo, pp. 89. S. Highley & Son, London, 1853.

THE object of the above work seems to be, the instruction of the general reader, and has less the appearance of an advertisement than most popular treatises of this kind. The author is very well informed on the subjects on which he treats. His views are presented in a modest, but straight-forward manner, and he does not hold out the disgusting idea that his method of practice is peculiar to himself, and as a consequence, superior to that of his professional brethren. He frankly acknowledges, in the preface, his inability to throw any additional light upon the diseases of the teeth, and that the object he has in view, is, "to make the general reader familiar with the chief features of the most important diseases to which the teeth are liable."

The introduction is devoted to a brief description of the different substances which enter into the formation of a tooth, and the part which the teeth play in the first stage of digestion. Caries of the teeth next engages his attention, and here, he advocates the old doctrine of Paré, Hunter, Fox and Bell, that the structural alteration constituting the disease, is the result of inflammation of the dentine. The remedial indications of the disease are next noticed; after which, he treats successively, on "exostosis," "necrosis," "accidental injuries of the teeth," "effects of mercury," "gum-boil," "diffused abscess," "fall of the teeth in old age," "tartar," "diseases of the alveoli and gums," "artificial teeth," and "artificial palates."

Although we differ with the author in many of the opinions which he has adopted, still we cannot but admire the modest and dignified manner in which they are presented to the reader.

Iowa Medical Journal.

We have received the two first numbers of this periodical. It is a monthly. It is edited by the medical faculty of the Iowa University, and contains much instructive matter.

If, we mistake not, Keokuk, a new town on the frontiers of civilization, has now *two* medical periodicals. Baltimore, a century old, with two hundred thousand inhabitants, three hundred M. D's and half a dozen hospitals, has no medical journal, no medical association, no museum worth an hour's time to look through. Who is to blame?

Peninsular Journal of Medicine and the Collateral Sciences.

Another new candidate for professional favor and a promising one. Three numbers, those for July, August and September have reached us. E. Andrews, A. M., M. D., demonstrator of anatomy in the University of Michigan, is its editor. It is published at Ann Arbor. It is neatly gotten up as to its mechanical department, and the editor appears to be well qualified for his post. The numbers which we have received compare favorably with its contemporaries on our exchange list. We wish the editor success. He deserves it.

EDITORIAL DEPARTMENT.

Our New Volume.—We are entering upon a new volume, with new plans and new hopes. It is not to be denied, that the standard of eminence in dentistry has been gradually becoming higher and higher since the first foundation of this Journal. People demand of us more knowledge than they did twenty-five years ago, when a dentist stood but little higher in the social scale than a mere mechanical artizan. Without speculating on the causes of this advancement in the public demands, which has only gone on in the same ratio with the progress which dentistry itself has made, we are content to recognize and publicly acknowledge the fact.

In view of such a state of affairs, we have felt it to be our duty, as journalists, to take a step forward, in order to keep pace with this onward march of improvement. We have seen, as every thinking man must see, that quite a variety of information is necessary to the man who would

successfully manage the teeth, whether he aims to preserve them from disease, or remedy the ill effects of morbid action, when that has once been set up. For this purpose he requires to understand all the modifications which these organs must suffer, from congenital vices of the system, or from acquired predisposition to disease, or from actual disease, or from functional derangement of the secretions, or from neglect of cleanliness and the consequent corrosive action of decaying food and putrefying secretions.

We presume that these premises will hardly be called in question, and if any of our readers should be disposed to doubt them, we ask him to sit down quietly and reflect upon the subject for twenty minutes; to consider the relations which these organs bear to the great function of digestion; how defectvie nutrition in early life must affect them; how manifold are their nervous sympathies which link them with so many and so remote organs, and, to come to their direct, plain and palpable connection with the secretions, how completely they are at the mercy of all acids which may be generated in the mouth, or rejected into it from the stomach.

Thus, without speaking of the many points in which anatomy, physiology and pathology touch the study of dental surgery, we see what a wide range of organic chemistry we require for the elucidation of the simple problem of the origin of caries. What agency does morbid saliva take in the production of this disease? How does decaying mucus act? What are the acids generated by putrefying food, and what is their action upon the teeth? How do these organs vary in different habits of body, and how are these varieties affected with the same acids? These are important practical questions, which must be answered by every man who is concerned about the prophylaxis of caries. And how wide a field of inquiry do they open! A very extensive investigation in the different departments of organic chemistry is required for this purpose. We must understand the chemistry of these solids and fluids, both in health and in disease, as the fundamental fact in our investigation. We must know what changes take place in the various articles of food, during their decomposition, and how they react upon healthy or diseased saliva. We therefore must have a very general acquaintance with organic chemistry, the office of which is to teach us these things.

But there is another class of inquiries equally important to the scientific dentist. How do these same acids, so generated, affect the materials introduced into the mouth to rectify the defects induced by disease? Still further, what are the reactions of the metals themselves during the process of preparing them for introduction into the mouth? How can a definite alloy be made, and what are the best properties for it? What is the best compound for making artificial teeth? How do the various substances react on one another at a high heat? What are the coloring matters, and how are they prepared? Thus it will be seen that, if the

practical man in the different departments of dentistry would succeed, he must look into the various departments of chemistry far more closely than he would, at first sight, suppose.

It is in view of such facts as these that we have determined to add three distinct Summaries to our present volume. These are, 1st, a summary of the practical improvements in dentistry, whether mechanical or surgical; 2d, a summary of the progress of anatomy and physiology, so far as they throw any light upon matters connected with this art; 3d, a summary of the progress of chemistry. This last will include all new facts in the chemistry of digestion and of the secretions and solids of the mouth, new facts in the comparative chemistry of the teeth, new processes of metallurgy, of electrotyping, of porcelain manufacture, and all improvements in the arts which may elevate that profession to which our Journal is specially addressed.

The present number is but an earnest of what we intend to do. We ask the attention of the profession to it, confident that they will find in it much new matter, not easily obtained elsewhere, and very important to all who desire to be scientific dentists. We feel that we are furnishing a Journal which deserves the patronage of a liberal and enlightened profession, and we look for that support which we think we have a right to expect. Let our old subscribers show this new number to their friends, and interest themselves to advance its circulation. The more they extend our circulation, the more will they increase our facilities for serving them, and the more advantage will they, themselves, derive.

Third Editor.—The importance of a knowledge of chemistry to the practitioner of dental surgery, being now generally admitted, the conductors of the Journal have determined to extend the scope of their publication by introducing into it a new department—one devoted exclusively to chemistry and metallurgy, as applied to dentistry. To do this, will require a greater additional amount of labor than their arduous professional duties will permit them to bestow upon the subject. They are happy to announce, however, that they have secured the services of Dr. A. S. Piggot, a gentleman, in every respect, eminently qualified for the task, and already known to the readers of the Journal, as the author of several ably written papers on the chemistry of the fluids of the mouth, which have appeared in its pages. Dr. P. is also the author of a work just published, of about five hundred pages, on dental chemistry and metallurgy. Thus, in associating him with them in the editorship of the publication, they feel that they have been peculiarly fortunate in obtaining the assistance of a gentleman whose labors will contribute so largely to enhance the value of their work.

Having now fairly introduced Dr. Piggot to their readers, they do not

deem it necessary to say more by way of commendation. They would add, however, that the Journal will continue to be conducted upon the same liberal and independent principles which have heretofore characterized its course; and, while the editors will endeavor to make it as practically useful as possible, they, at the same time, wish it to be distinctly understood, that it will not cater for any party, or clique, or set of men, but for the whole profession.

Reproduction in the Maxillary Bones.—The Southern Journal of Medical and Physical Sciences, for September, 1853, contains a very interesting article on "Repair" and reproduction in the maxillary bones, by the editor of the dental department of that publication. It embodies, besides some very sensible physiological remarks of the author, the opinions of numerous writers upon the subject; some of which are adverse to the doctrine that the loss of the whole, or any part of either of these bones, is ever replaced with true osseous structure, while others, founded upon well authenticated facts, establish most conclusively, that the reproductive energies of the economy are, under certain circumstances, exercised here as well as in other parts of the osseous system. The author quotes, in a note to his article, an editorial from the October No., 1852, of this Journal, in which the doctrine of reproduction in the maxillary bones is opposed, and attributes the authorship of it to the senior editor. In connection with the opinion here expressed, he refers to our remarks on the loss of the alveoli in our Principles and Practice of Dental Surgery, and putting the two together, he arrives at the conclusion, that we believe, "the maxillary bones are incapable of regeneration, either in whole or in part."

The editorial quoted by Dr. Wood, from this Journal, was written by the junior editor, and only expressed his own individual views, as derived from the general tenor of the authorities which he had, at that time, read upon the subject. The senior editor has long been of the opinion, that the power of regeneration is, under certain circumstances and conditions of the surrounding structures, exercised in the maxillary as well as in other bones of the body. Although an example of the kind has never fallen under his own immediate observation, several well authenticated cases are on record. Dr. E. S. Bennett, of Charleston, S. C., communicated to him, through Dr. J. A. Cleveland, of the same place, the history of a case which was published in the first number of the fifth volume of this Journal. The subject was a negro child, about two years and a half old, and the loss occasioned by necrosis, extended from the right inferior canine tooth to the articulation on the left side. The necrosed bone was removed by Dr. Bennett, and is now in the Museum of the Baltimore College of Dental Surgery.

"This case," says Dr. B. "settles the question definitely, as to whether

nature, of herself, is capable of reproducing the bony structures entirely; in this case, not only the whole bone has been reproduced, but dentition also—being now armed with two formidable grinders."

A case of reproduction of the body of the inferior maxillary bone, extending from one coronoid process to the other, was described to the senior editor several years ago, by the late Dr. Snyder, of Baltimore. The subject was a boy, about twelve years of age. The loss of the primitive bone was occasioned by mercurial salivation. But in this case, there was no reproduction of teeth.

The history of a case of a somewhat similar character, communicated by Wm. Jones, M. D., of Kenton, Ohio, was published in the last number of this Journal.

But, while we are convinced that nature sometimes makes a successful effort to replace the loss of a part, and occasionally, even of the whole of the inferior maxillary, examples of such reproductive energy here, it must be confessed, are exceedingly rare, and there is not, we believe, a single well authenticated case on record, to show that the loss of alveoli simply, whether occasioned by mechanical violence, necrosis, or any other cause, are ever replaced.

Dentists Slandering each other.—We scarcely know how to reply to our fair correspondent, whose letter, under the head of professional etiquette, we published in another part of the present No. of the Journal. She has been unfortunate, it must be confessed, in her intercourse with dentists, and we would be hard hearted indeed, if we did not sympathise with her in her distress. The prospect of losing two central incisors, is enough to fill the heart of any beautiful young lady with sorrow. But we trust she has had the good fortuneere this, to secure the services of some one more worthy of confidence than Drs. 2, 3, and 4, and the other gentlemen of the profession on whom she called. If so, she has realized that the "little blue bright blades" with their "jeweled handles," in skillful, experienced hands, are not the terrible things she had pictured them to be in her imagination.

The spirit of illiberality of which our fair friend speaks, to call it by no harsher name, is not so universal among dentists as she seems to suppose. That it exists at all, is, certainly, very much to be regretted. That any member of the dental profession should be so lost to shame, and so destitute of gentlmanly feeling, as well as of a proper sense of self-respect, as to descend to the use of such unworthy and reprehensible means to obtain practice, is a source of sorrow to all honorable, high minded practitioners. It may sometimes succeed with ignorant unsuspecting individuals, but the selfish motive is too apparent not to be seen through by most persons, and whether it has its origin in jealousy or love of gain, it is equally despicable.

We are not surprised, therefore, that one possessed of such fine feelings, and so just an appreciation of common courtesy as our fair correspondent, should, from the disrespectful manner in which the dentists on whom she called, spoke of each other, have formed an unfavorable opinion of the whole profession. If a dentist thinks to elevate himself in public estimation by traducing his neighbor, the letter of our fair friend will show to him how sad a mistake he has committed, and we would that it could be read by every one who resorts to such dishonorable means to obtain practice. The rebuke, not more severe than just, will, we hope, be productive of good, and we publish the letter for the benefit of those interlopers of the profession—pseudo-practitioners, for we do not believe that a well educated dentist would stoop to such meanness—whose chief claim to consideration seems to consist in unscrupulous self-laudation and a readiness to disparage the merits of others.

So much for the *tares* of the profession, which, we are sorry to confess, have sprung up rather thickly in our midst, but we are consoled by the belief, that time and good culture will ultimately weed them out. The number of well educated dentists is rapidly increaing. Even now, almost every town and city in the union, can boast of one or more practitioners of this description.

We have now answered, to the best of our ability, the questions, (and they have perplexed us not a little,) proposed by our fair friend, Kate, and if the explanation we have been able to give, shall have the effect of removing from her mind the unfavorable impression which she seems to have formed of our profession, for we would not on any account have her continue in so unjust a belief, we shall not regret having attempted to comply with her wishes. Having said thus much, we will promise, but mind, in doing so, we are not influenced by any interested motive, should we ever have the pleasure of meeting her in our *drawing* room, to do all in our power to divest the "keen paraphernalia of our private inquisition," of the terrors with which they seem to have inspired her sensitive nature.

We scarcely know whether to regard the playful hit which she makes at practitioners of the other departments of medicine as intended to be personal or not, having in years long since gone-by exercised the vocation of a physician, but be that as it may, it is so prettily made, we cannot find it in our heart to take exception to this part of her letter. Our friend, Dr. Piggot, however, it being a matter in which he, at this time, is more immediately interested, may feel a little sensitive upon the subject, but, in this instance, we shall exercise the prerogative of our editorial seniority, and insist upon his bearing it without a word of reply.

Summary.—As we are not able to publish entire all valuable articles which appear in other Journals, we have introduced a new department,

in which we propose to give a condensed summary of such papers as we cannot transfer without abridgment to our pages, which will be arranged under the following heads: *Dental Science, Dental Chemistry,* and *Progress of Anatomy and Physiology.* The summary under the second and third heads, will appear in alternate numbers. In this way, we hope to be able to furnish our readers with every thing of interest or value, connected with the progress of dental science, which may from time to time, appear either in this country or Europe. In doing this, we impose upon ourselves a large additional amount of labor; but, we hope to be able to enhance the value of the Journal, so much by it, as to secure a corresponding increase in the number of its subscribers.

In preparing the "quarterly summary," we shall endeavor to give the substance of each article, but shall be compelled, for the most part, to do it in our own language; but where we can, consistently with the brevity necessary to be observed, we shall use the words of the author, placing them, however, in quotation marks, only, when a paragraph is transferred without alteration or abridgment. But we shall endeavor, in all cases, to give his exact meaning, without expressing, in immediate connection, any opinion of our own concerning it.

Sponge Gold.—We have repeatedly called attention to this article, since the first sample of it was received. At the instance of the senior editor of this Journal, several experiments were instituted by the junior editor, to ascertain the method of making it.

It was found that a variety of plans would give a spongy, porous cake of gold which would readily weld. Indeed, gold in fine powder, as precipitated by the protosulphate of iron or oxalic acid, welds readily under pressure, a property which is also possessed by finely divided silver, though not in the same degree. The objection to employing it in this way, consists in its extreme division, the lightness of the powder, and the consequent great waste in the mouth.

A porous mass may be readily obtained by fusing together one part of gold and two or two-and-a-half of silver, running the alloy through a rolling mill, to reduce it to a thin ribbon, rolling this up into a spiral coil, and treating it with nitric acid; in short, going through all the manipulations of the well-known metallurgic operation of parting. Three doses of nitric acid are necessary, the first of a weak acid, the next of one of medium strength, and the third, of concentrated acid. This process, if properly conducted, dissolves out all the silver, with the exception of a very minute portion, and leaves the gold much purer and more adhesive than ordinary foil. The cornet, however, as taken out of the flask after the parting is completed, is very weak and frail, owing to the extreme porosity and great expansion of the gold. It cannot even be handled, it is

so tender. It must, therefore, be carefully tilted into a crucible or some such vessel, and heated to orange redness in a muffle, taking care not to fuse it. When it is removed, it will be found to have contracted very considerably, to have become firmer, and to have assumed something of a golden hue, instead of the dull and almost coppery brown, it had before being heated. It is now no more than a roll of heavy foil, perforated in all directions with minute pores, occupying the place of the particles of silver which have been removed by the acid. This operation requires great care. An unskillful and inexperienced hand will leave so much silver in it, as seriously to interfere with its welding, and to give it a pale lemon yellow tint, or will destroy the cornet by reducing it to a mere powder. When well made, it should be a deep yellow; approaching a red, and its surface should have the appearance of deadened gold.

Another method in which gold can be brought to the condition of a porous cake, is simpler than the last. A solution of perfectly pure gold in aqua regia is evaporated to dryness, and then slowly heated to an orange red, at which it is to be kept a few minutes. There remains an irregularly porous cake, which welds with great facility.

In our last issue, we published the formula of the New York patentee, which gives a crystalline mass, or a lustreless sponge, according to the manner in which the operation is conducted. We refer our readers who desire to be informed on this subject, to our July number.

Some months since, the senior editor received a letter containing a specimen of sponge gold from Mr. Tomes, prepared by Mr. Barling, which was equal, if not superior, to any preparation of the kind he had used up to that time. He has recently received another letter from Mr. T., which he hastens to lay before the readers of the Journal. The preservation of the article in naptha, is an excellent idea. A perfectly pure surface is thus ensured, and it is not necessary, to inform our readers, how essential that is to the success of any attempts to weld gold.

We publish below that portion of Mr. Tomes' letter relating to this article.

37 Cavendish Square, London, *August* 8*th*, 1853.

Dear Sir:—Some months since I wrote to you, * * * and enclosed a specimen of the sponge gold prepared here. Since that time, the party who made the preparation has been actively engaged in its improvement. A few days since, he sent me a bottle of sponge gold far superior to any I had seen before. It is kept in naptha, and this is ignited and burnt off when you want to use gold. Treated in this manner, it is most extraordinarily adhesive, and readily works up into a solid plug; bit by bit is added, the fresh morsels readily uniting with that which has been compressed, it being necessary only to keep the surface dry and a little rough. I find it best to press the gold into the cavity with a tolerably large instrument, and then to use a pointed one, of course; burnishing in the progress

of the filling is to be avoided. After completing the plugging and filing, the burnishing requires to be done with a light hand, otherwise, from the peculiar condition of the gold, the instrument becomes coated with the metal, and scratches, instead of polishing. I feel greatly interested in the ultimate results of the experiment; because, I think, the preparation intrinsically good, and because, I trust the maker may be remunerated for his labor and expenses. I give you his address. Mr. Barling, Jeweller, High Street, Maidstone, Kent, England.

Yours, faithfully, John Tomes.

Artificial Teeth Attached to an Auroplastic Base.—Mr. Edwin Truman, dentist, of London, has recently published a treatise on the application of artificial teeth upon the auroplastic principle. The base is formed of gutta percha, and the exposed surface plated with gold, by means of electro-galvanism. The author has secured to himself the exclusive right of the principle by letters patent. We publish the treatise entire, except the preface, among the selected articles of the present issue of the Journal. Whether artificial teeth mounted upon a base of this sort, will stand the test of experience, is, we think, more than questionable. We believe, therefore, that we hazard little in saying, *a priori*, that the substitution of it for gold and platina, the metals now generally employed for this purpose, will never become general.

In alluding to the use of gutta percha as a base for artificial teeth in a former number of the Journal, we stated that we believed Dr. Hill, of Norwich, Ct., was the first to test its applicability for this purpose. He informed us by letter, about four years ago, if our memory serves us correctly, that he had then made some experiments with it, which promised the most satisfactory results. We should be glad to hear from him again upon the subject, and learn to what extent his expectations had, by his subsequent experience, been realized.

Multiplication of Dentists in the West.—An esteemed correspondent, writing from Illinois, says: "Dentists are multiplying in the west, still I know but few who are well qualified. Some have art without science, others have science without art; some have neither, and all think themselves dentists. The valley of the Mississippi, is a great field. The laborers are few. I hope you will send us more, such as are thoroughly furnished for the work." He also adds, that there are many good towns there in which capable young practitioners could do well.

We thank our correspondent for the kind invitation, and the liberality of feeling which prompted him to give it; but as yet, we have none such as he writes for, to spare. We have not enough at this time to supply the

demand east of the mountains; but, we will do all we can to meet his wishes, and have no doubt, our friends a little further east and north, as well as those of the Queen City, will aid us in our charitable desire to oblige him.

Twenty-five or thirty years ago, there were not more than a hundred dentists in the United States; now, there are about four thousand, and still the demand for the services of practitioners of dentistry, cannot be as easily supplied now as it was then. Where one person employed a dentist then, a hundred do it now. Fifteen thousand dollars worth of gold foil, was, probably, as much as was used by all the dentists in the United States in a year, at that time. Now, two hundred thousand dollars worth scarcely supplies the demand. Should the increase in the quantity used, continue in the same ratio for the next twenty-five or thirty years, the amount then, annually employed, would be enormous; it would exceed considerably two million dollars, and that it will thus continue to increase, there is not the slightest doubt.

Honors to American Dentists.—We recently had the pleasure of meeting Dr. Evans, surgeon dentist to the present ruler of France, who has, in the course of the past six years, attained a very high reputation. He is regarded as the first dentist on the continent of Europe, and superintends more regal and imperial teeth than all the rest of them put together, to say nothing of ducal and other lower grades of aristocratic masticators.

These "porcelain" gentry have one very attractive quality as customers. They generally are more substantially grateful than the commoner specimens of human pottery. Dr. Evans has several very beautiful tokens of regard from these distinguished individuals.

Louis Napoleon has given him an elegant gold jewel-box, richly set with diamonds in cyphers and N's, and placed on a pedestal of green velvet, adorned with golden bees.

The Queen of Holland has given him a still more costly box of the same character, most richly enamelled and studded with larger diamonds.

Add to these an opal breast-pin from Austria; a set of agate vest-buttons, ornamented with rubies and diamonds, from Baden Baden; a jeweled ring from that noble, heroic princess, the exiled Duchess of Orleans; the cross of the legion of honor from Louis Napoleon; with a host of similar trifles from various notabilities, and our readers will have an idea of what a very pleasant business it is to relieve the minor troubles of the magnificoes.

We must say for Dr. Evans, that he bears his honors very modestly, and that he is amiable, gentlemanly, aud unaffected in his deportment. Some envious curs will, of course, snarl at him, and say ill-natured things of him for exhibiting these things, but their spite is occasioned by his *hav-*

ing the mementoes and not by his *showing* them. For our own part, we think it a very commendable and honest pride, which induces a man to exhibit the trophies of his own skill, industry, and application to business. Besides this, a prudent man, who wishes to increase his business, will do this very thing, knowing, as he does, that there are multitudes of snobs who would pay any thing to have the same hand introduced into their vulgar mouths, that has wandered over the portals of an emperor's throat. The silly frogs that bite at red flannel are not without their analogues among more intelligent animals.

A New Method for Constructing a Base for Artificial Teeth.—Dr. A. Fitzpatrick, dentist, of Calcutta, has recently published a small treatise on the application of artificial teeth, in which he describes a new method he has adopted for the construction of the base. The object which he proposes to gain by it is, to obviate the inconvenience arising from having the whole surface of the palate covered with a plate. To prevent which, large holes are cut in the plate, leaving those parts of the palate which are supplied with sensation from the anterior and posterior palatine nerves, uncovered. The author has applied several dental substitutes, mounted on bases of this description, and with such good results as to induce him to recommend their use to the profession. One of the editors has applied an upper set of teeth, mounted on a base of this kind, though in a somewhat modified form, which have been worn about ten weeks, with great comfort and satisfaction. Plates constructed in this way, should be slightly thicker than those ordinarily employed, to prevent the liability of their being too easily bent. When fitted with the necessary accuracy, they adhere with sufficient tenacity, and are certainly worn with less inconvenience than dental substitutes as usually constructed, but whether the base will retain its adaptation as long, is a question which can only be determined by experience. Dr. Fitzpatrick is sanguine in the belief that it will ultimately supersede the base at present employed.

Chloroform Inhalations.—A writer over the signature of G., in the Peninsular Journal of Medicine, says of the safety of chloroform inhalation, "we consider it about as safe to the patient as a journey by railroad or steamboat to the passengers. Our rule is never to use it in trivial cases, when the operation requires but a single stroke of the knife, or actually recommend it in any case. We make to our patients the above statement of its comparative safety, and if they elect, we administer it, taking due care that it is well mixed with atmospheric air, watching closely the pulse and respiration. With these cautions, we bide our time, await our turn for an accident, and confess to a growing dread of the agent."

A better illustration could not have been given, and inasmuch as its use is liable to be attended with fatal consequences, we do not think so powerful an agent should be administered, except in protracted surgical operations.

Dental Expositor.—The editor of this semi-annual, Dr. Solyman Brown, commenced, in the May number, the republication of his treatise on Mechanical Dentistry, which appeared about twelve years since in this Journal. The author has thoroughly revised it, and will add all the improvements which have been made subsequently, in this department of dental practice. Dr. B. is known to our readers as an accomplished scholar and writer, and of his ability to produce a valuable treatise on mechanical dentistry, there can be no doubt. The Expositor is furnished to subscribers at twenty-five cents a year, and separate copies of the treatise on Mechanical Dentistry, printed on thick vellum paper, bound at the close of the volume in handsome muslin, can be had for one dollar, paid in advance, or two dollars when completed. The value of the work will, we feel assured, commend it to the profession, and more especially to its younger members. We hope the editor may be liberally remunerated for his labor.

Portrait of Professor J. D. White.—We have received from Drs. W. W. Fouche, C. C. Williams and J. H. McQuillen, a most excellent lithograph likeness of Professor White, of the Philadelphia Dental College, gotten up in a manner highly creditable to the artists who executed it. The likeness is good, and we beg to return to the gentlemen who had the kindness to send it to us, our warmest thanks for so acceptable a present. Another, equally good, but of smaller size, was published in the April number of the Dental News Letter, which some good friend took from our table immediately after it was received. After waiting about three months, hoping it would be returned, we were compelled to write to the publishers for a duplicate copy. But for this circumstance we should have noticed it in the July number of the Journal.

Supposed to have been Lost at Sea.—We learn, with the most sincere regret, from a letter addressed to professor P. H. Austen, by Dr. J. F. Sanborn, of Beverly, Mass., that Dr. D. G. Varney, who went to California in 1849, sailed from thence for the Sandwich Islands in a small vessel, which not having since been heard from, is supposed to have foundered at sea on her passage. Dr. Varney graduated with high honors, at the commencement of the Baltimore College of Dental Surgery, in 1848, and some of the prettiest specimens of mechanical dentistry in the Museum

of this institution, were presented by him to the Faculty on the occasion of his examination. He was a young gentleman of most persevering industry, good moral character, gentlemanly deportment, and of high promise. We hope, however, that the melancholy fate apprehended by his friends, may not have befallen him.

Ice as a Local Anæsthetic.—For some time past, the French surgeons have been using a mixture of pounded ice and salt to produce local anæsthesia. This has been employed especially in that extremely painful operation, the removal of the toe and finger-nails.

The ice is pounded finely and then mixed with a sufficient quantity of dry salt, enveloped in a cloth, (one of thin oiled silk we should think preferable,) and applied to the part. It should not remain longer than five or six minutes, and the operation should be commenced immediately upon its removal. The application, simple as it is, disarms the operation of all its terrors, the patient witnessing it with the same composure as the bystanders. No ill-effects have been known to follow its employment.

Could it not be made to supersede chloroform in some dental operations?

Corundum Files, Slabs, and Wheels.—We have received from S. Wardle & Co., Cincinnati, Ohio, some very superior corundum files, slabs, and wheels, of their own manufacture. They are incomparably better than instruments of the same kind made of emery, and we find them fully equal to those obtained from England. Every dentist, having any thing to do with artificial teeth, will find it greatly to his advantage to use them. We believe that S. Wardle & Co. are the only persons, except Jones, White & McCurdy, who manufacture these articles in the United States, and for the very handsome assortment which they were so kind as to send us, we beg to return our thanks.

Tax on Lawyers, Physicians and Dentists.—Judge Lomax has pronounced the tax on lawyers, physicians and dentists, in Virginia, to be unconstitutional. In consequence of which, the town council of Fredericksburg have directed, that such taxes for 1852 be refunded. A similar law was passed by the Legislature of Maryland, a few years since, but, we believe, was never carried into effect, and has subsequently been repealed.

Spotted Child.—The Boston Medical and Surgical Journal learns from the Manchester, N. H., Mirror, that a spotted child was recently born at Barnstead. "One half of the head, including one half of the forehead, is black, while the counter half is white. The face below the eye-brows, assumes an ash-yellow." The other parts of the body, except the shoulders, which are spotted, are white.

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ARTICLE I.

Chemistry of the Metals—Platinum. By Professor Reginald N. Wright, A. M., M. D.

(Continued from page 14.)

The discovery of this metal is of comparatively recent date, going back no farther than the year 1741; it was then first mentioned. It occurs only in the metallic state, and commonly in small masses or grains, which are sometimes flat, sometimes rounded, and always possessing a high metallic lustre. It was first discovered in the West Indies, and described by Dr. Wood; it was afterwards discovered in considerable quantities in the alluvial depositions of several of the South American states, and described by Boussingault and Humboldt; the latter philosopher, having been so fortunate as to discover a piece larger than a pigeon's egg, and weighing 1088.5 grains. Brazil, Colombia and Peru are the South American provinces yielding the largest amount of the metal. The metal from the province of Antioquia, and described by Boussingault, occurs in sienitic veins. At a period later than the date of its discovery in America,

platinum has been found in considerable quantities in the Ural mountains. Its grains commonly contain *gold*, *irridium*, *palladium*, *rhodium* and *osmium;* occasionally some others.

Platinum is exceedingly refractory in the fire, being unaffected by the heat of strong wind furnaces, but fusing with scintillation in the flame of the oxyhydrogen blowpipe; it is malleable and ductile to an astonishing degree, and like iron, may be welded with a hammer. It resists the action of most acids and the air, and is quite indispensable in the operations of the laboratory.

With regard to the action of platinum on gasses, Turner has the following paragraph, (vol. i, page 603,) "The remarkable property, observed by Döbereiner, in *spongy platinum* of causing the union of oxygen and hydrogen gasses, was mentioned at page 251; a property, which Dubony and Thenard showed to be also possessed, though in a lower degree, by platinum in its compact form of wire or foil, and by several other metals. (Au. de Ch. et Ph. xxiii and xxiv.) Faraday (Phil. Trans. 1834, part i) has lately discussed, with his wonted ability and success, both the conditions required for the effective action of platinum, and the cause of the phenomenon. The sole conditions are, purity of the gasses, and perfect cleanliness of the platinum. By cleanliness is meant, perfect absence of foreign matter, pure water excepted; and this condition is easily secured, by *fusing pure potassa* on its surface, *washing off the alkali, by pure water*, then dipping the platinum in hot *oil of vitriol*, and again washing with water. In this state, platinum foil acts so rapidly at common temperatures on oxygen and hydrogen gasses mixed in the ratio of 1 to 2, that it often becomes red hot and kindles the mixture. Handling the platinum, wiping it with a towel, or exposing it to the atmosphere for a few days, suffices to soil the surface of the metal, and thereby diminish or prevent its action. These phenomena, are supposed to result from the concurring influence of two forces, the *self-repulsive* energy of similar gaseous particles, and the adhesive attraction exerted between them and the platinum. Each gas, repulsive to itself and not repelled by the platinum, comes into the most intimate

contact with the metal, and both gasses are so condensed upon its surface, that they are brought within the sphere of their mutual attraction, and combine." He goes on to say, that "the action of the platinum is retarded or wholly destroyed by the presence of small quantities of certain *gasses*, such as *hydrosulphuric acid*, *carbonic oxyd*, and *olefiant gasses*. One would be tempted to suppose that these gasses act by soiling the metallic surface, though in some respects the explanation is not satisfactory."

We next proceed to lay before our readers, the method of purifying platinum, and inasmuch as the credit of the best process seems to be almost universally ascribed to Dr. Wollaston, we subjoin his plan as copied from the *Philosophical Transactions of* 1829.

"The usual method of giving chemical purity to this metal, by solution in *aqua regia*, and precipitation with *sal ammoniac*, are known to every chemist; but I doubt whether sufficient care is usually taken, to avoid dissolving the iridium, contained in the ore, by due dilution of the solvent. In an account which I gave in the *Philosophical Transactions of* 1804, of a new metal, *rhodium*, contained in crude platinum, I have mentioned this precaution, but omitted to state to what degree the acids should be diluted. I now, therefore, recommend, that to every measure of the strongest muriatic acid employed, there be added an equal measure of water; and, that the nitric acid used, be what is called '*single aquafortis;*' as well for the sake of obtaining a purer result, as of economy in the purchase of *nitric acid*. With regard to the proportions in which the acids are to be used, I may say, in round numbers, that *muriatic acid*, equivalent to 150 marble, and *nitric acid*, equivalent to 40 marble, will take 100 of crude platinum; but in order to avoid waste, and render the solution purer, there should be in the menstruum, a redundance of 20 per cent. at least, of the ore. The acids should be allowed to digest three or four days, with a heat gradually raised. The solution, being then poured off, should stand until a quantity of fine pulverulent ore of *iridium*, suspended in the liquid, has subsided; and, should then be mixed with 41 parts

of sal ammoniac, dissolved in about 5 times their weight in water. The first precipitate, which will thus be obtained, will weigh about 165 parts, and will yield about 66 parts of pure platinum. As the mother-liquor will still contain about 11 parts of platinum, these, with some of the other metals yet held in solution, are to be recovered, by precipitation, from the liquor with clean bars of iron, and the precipitate is to be redissolved in a proportionate quantity of *aqua regia*, similar in its composition to that above directed; but in this case, before adding *sal-ammoniac*, about 1 part by measure of strong muriatic acid should be mixed with 32 parts by measure, of the *nitro-muriatic* solution, to provent any precipitation of palladium, or lead, along with the ammonia-muriate of platinum. The yellow precipitate must be well washed, in order to free it from the various impurities, which are known to be contained in the complicated ore in question; and must ultimately be well pressed, in order to remove the last remnant of the washings. It is next to be heated with the utmost caution in a black-lead pot, with so low a heat as just to expel the whole of the sal ammoniac, and to occasion the particles of platinum to cohere as little as possible; for on this depends the ultimate ductility of the product.

"The gray product of the platinum, when turned out of the crucible, if prepared with due caution, will be found highly coherent, and must then be rubbed between the hands of the operator, in order to procure, by the gentlest means, as much as can possibly be so obtained, of metallic powder, so fine as to pass through a fine lawn sieve. The coarser parts, are then to be ground in a wooden bowl, with a wooden pestle, but, on no account with any harder material, capable of burnishing the particles of platinum; since every degree of burnishing, will prevent the particles from cohering in the further stages of the process. Since the whole will require to be well washed in clean water, the operator, in the later stages of grinding, will find his work facilitated by the addition of water, in order to remove the finer portions, as soon as they are sufficiently reduced, to be suspended in it.

"Those who would view this subject scientifically, should here

consider, that as platinum cannot be fused by the utmost heat of our furnaces, and consequently cannot be freed, like other metals, from its impurities, during igneous fusion, by fluxes, nor be rendered homogenious by liquefaction, the mechanical division through water should here be made to answer, as far as may be, the purpose of melting; in allowing earthy matters to come to the surface by their superior lightness, and in making the solvent powers of water effect, as far as possible, the purifying powers of *borax* and *other fluxes*, in removing soluble oxyds.

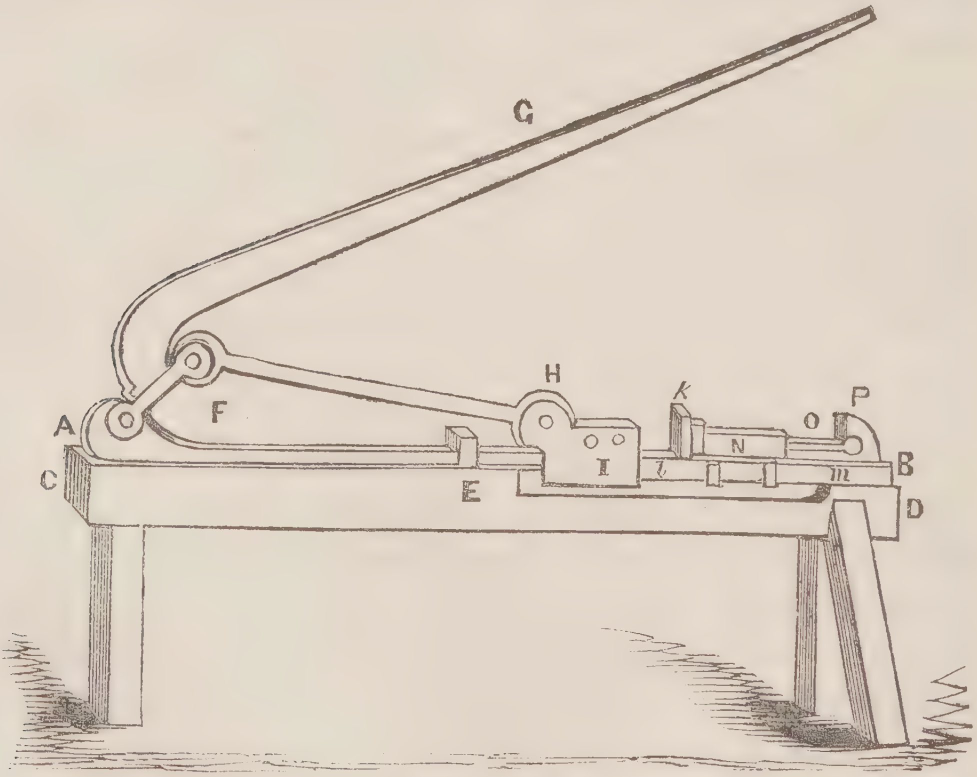
"By repeated washing, shaking, and decanting, the finer parts of the gray powder of platinum may be obtained as pure, as other metals are rendered, by the various processes of ordinary metallurgy; and, if now poured over, and allowed to subside in a clean basin, a uniform mud or pulp will be obtained, ready for the further process of casting.

"The mould which I have used for casting, is a brass barrel $6\frac{3}{4}$ inches long, turned rather tapering within, with a view to facilitate the extraction of the ingot to be formed, being 1-12 inches in diameter at the top, and 1-23 inches, at a quarter of an inch from the bottom, and plugged at its larger extremity, with a stopper of steel, that enters the barrel, to the depth of a quarter of an inch. The inside of the mould being now well greased, with a little lard, and the stopper being fitted tight into the barrel, by surrounding it with blotting paper, (for the paper facilitates the extraction of the stopper, and allows the escape of water during compression,) the barrel is to be set upright in a jug of water, and is to be itself filled with that fluid. It is next to be filled quite full with the mud of platinum; which subsiding to the bottom of the water, is sure to fill the barrel without cavities and with uniformity—a uniformity to be rendered perfect by subsequent pressure. In order, however, to guard effectually against cavities, the barrel may be weighed after filling it, and the actual weight of its contents, being thus ascertained, may be compared by that weight of platinum and water, which it is known by estimate, that the barrel ought to contain. A circular piece of soft paper first, and then of woollen cloth, being laid upon the surface, allow the water to

16*

pass, during the partial compression by the force of the hand with a wooden plug. A circular plate of copper is then placed upon the top, and thus sufficient consistency is given to the contents to allow of the barrel being laid horizontally in a forcible press.

"The press which I have generally used for this purpose, consists of a flat iron bar A B, set edgeways, and screwed down by a hook E, near its middle, (where it would otherwise be liable to bend,) to a strong wooden bench C D. The bar is connected by a pivot at its extremity A, with the lever A, F, G. An iron rod F H, which turns at its two extremities upon the pivots, proceeds from the lever at F, and, as the lever descends, propels forward the carriage I, which slides along the bar. A stopper or block being placed in the vacant space I *k*, the carriage communicates motion to the cradle *k l m*, which is also made to slide along the bar, and carries the barrel N, which lies upon the cradle, straight against the piston O, which rests by its end against P, a projection in the further extremity of the bar.



"The weight, which in this machine, when the angle of the lever's elevation is small, will keep the power, applied verti-

cally at the extremity of the lever, *in equilibrio* = that power $\times \frac{AG \times FH}{AF[AF+FH]} \times$ cotan. of the angle of the lever's elevation; which expression, in the case of the press actually used, becomes power $\times$ 5 cotan. of the angle of the lever's elevation. This expression, at an elevation of 5°, becomes nearly 60 $\times$ power, and at an elevation of 10°, becomes nearly 300 $\times$ power; and when the lever becomes horizontal, the multiplier of the power becomes quasi infinite. This explanation will be sufficient to show the mechanical advantage, with which, by means of this press, the weight of the operator, acting on the end of the lever, will be made to bear against the area of the section of the barrel, a circle little more than an inch in diameter. After compression, (which is to be carried to the utmost limit possible,) the stopper at the extremity being taken out, the cake of platinum will easily be removed, owing to the conical form of the barrel; and being now so hard and firm, that it may be handled without danger of breaking, it is to be placed upon a charcoal fire, and there heated to redness, in order to drive off moisture, burn out grease, and give to it a firmer degree of cohesion. It is next to be heated in a wind-furnace; and, for this purpose, is to be raised upon an earthen stand, about 2½ inches above the grate of the furnace, the stand being strewn over with a layer of clean quartz ore sand, on which the cake is to be placed, standing upright on one of its ends. It is then to be covered with an inverted cylindrical pot, of the most refractory crucible-ware, resting at its open end upon the layer of sand; and care is to be taken that the sides of the pot do not touch the cake. To prevent the blistering of the platinum by heat, (which is the usual defect of this metal in its manufactured state,) it is essential to expose the cake to the most intense heat that a wind-furnace can be made to receive, more intense than the platinum can well be required to bear under any subsequent treatment, so that all impurities may be totally driven off, which any lower temperature might otherwise render volatile. The furnace is to be fed with *coke*, and the action of the fire is to be continued for about twenty minutes from the time

of lighting it, a breathing heat being maintained during the last four or five minutes. The cake is now to be removed from the furnace, and, being placed upright upon an anvil, is to be struck, while hot, on the top with a heavy hammer, so as, at one heating, effectually, to close the metal. If, in this process of forging, the cylinder should become bent, it should on no account be hammered on the side, by which treatment it would be cracked immediately; but must be straightened by blows upon the extremities, dexterously directed, so as to reduce to a straight line the parts which project.

"The work of the operator is now so far complete that the ingot of platinum may be reduced, by the process of heating and forging, like that of any other metal, to any form that may be required. After forging, the ingot is to be cleaned from the ferruginous scales, which its surface is apt to contract in the fire, by smearing over its surface with a moistened mixture of equal parts, by measure, of crystallized *borax* and *common salt of tartar*, (which, when in fusion, is a ready solvent of such impurities,) and then exposing it, upon a platina-tray, under an inverted pot, to the heat of a wind-furnace. The ingot, on being taken out of the furnace, is immediately to be plunged into dilute sulphuric acid, which, in the course of a few hours, will entirely dissolve the flux adhering to the surface. The ingot may then be flattened into leaf, drawn into wire, or submitted to any of the processes of which the most ductile metals are capable.

"The perfection of the methods above described, for giving to platinum complete malleability, will best be estimated by comparing the metal thus obtained, in respect of its specific gravity, with platinum which has undergone complete fusion; and by comparing it in respect of its tenacity, with other metals possessing that quality in the greatest perfection. The specific gravity of platinum, drawn into fine wire from a button which had been completely fused by the late Dr. E. D. Clarke, with an oxyhydrogen blow-pipe, I found to be 21·16. The aggregate specific gravity of the cake of metallic mud, when first introduced into the barrel, exclusively of moisture, is about 4·3;

when taken from the press, it is about 10. That of the cake fully contracted, on being taken out of the wind-furnace before forging, is from 17 to 17·7. The mean specific gravity of the platinum, after forging, is about 21·25, although, that of some rods, after being drawn, is 21·4: but that of fine platinum-wire, determined by comparing the weight of a given length of it, with the weight of an equal length of gold wire, drawn through the same hole, I find to be 21·5, which is the maximum specific gravity that we can well expect to be given to platinum.

"The mean tenacity, determined by the weight required to break them, of two fine platinum-wires, the one of $\frac{1}{3000}$, the other of $\frac{1}{3850}$ of an inch in diameter, reduced to the standard of a $\frac{1}{10}$ of an inch in diameter, I found to be 409 pounds; and the mean tenacity of eleven wires, beginning with $\frac{1}{4500}$ and ending with $\frac{1}{25000}$ of an inch, reduced to the former standard, I found to be 589 pounds; the maximum of these eleven cases being 645 pounds, and the minimum 480 pounds. The coarsest and the finest wire which I tried, present exceptions, since a wire of $\frac{1}{150}$ of an inch gave 290 pounds, and a wire of $\frac{1}{30000}$ of an inch, 190 pounds. If we take 590 pounds, (as determined by the eleven consecutive trials,) to be the measure of the tenacity of the platinum prepared by the process above described, and consider that the tenacity of gold-wire, reduced to the same standard, is about 500, and that of iron-wire 600, we shall have full reason to be satisfied with the processes above detailed, by which platinum has been rendered malleable."

The account of the method of treating crude platinum we have given above, is (as we before remarked) that of Dr. Wollaston, as published in the Philos. Trans. of 1829, and we have taken the liberty of copying it verbatim, both because we believe it to be the best method extant, and because we could not describe it better, or more intelligibly, than he has done; the *careful observance* of the rules of practice therein laid down, will ensure a uniform and perfectly satisfactory result in every instance.

The following account of the alloys of platinum will be found in Brande, page 995:

"Alloys of Platinum.—With *potassium* and *sodium* it forms compounds which decompose water—(Davy.) Its alloy with *manganese* is unknown. *Iron* and *platinum* in equal parts, form a crystalline alloy which takes a fine polish. According to Dr. Lewis, the alloy of *cast iron* and *platinum* is hard, tough, and somewhat ductile, the density greatly exceeding the mean: it is brittle when hot. Stodart and Faraday found the toughness and smoothness of steel improved by one-hundredth of platinum—(Phil. Trans., 1822.) Wires of *steel* and *platinum*, when welded and polished, exhibit a curious and beautiful surface, especially when the steel parts are slightly acted on by dilute acid. This welding property of platinum may be usefully applied in the arts; wires may be joined so as to form rings and chains; and with a view to economy, platinum may be joined to iron or steel for many uses in the laboratory of the chemist. Platinum dissolves in fused zinc; the alloy is brittle, bluish-white, and hard: one-twentieth of platinum destroys the malleability of zinc, and one-fourth of zinc renders platinum brittle—(Lewis.) Tin and platinum combine in all proportions, forming alloys more or less brittle and fusible. When *tin-foil* and platinum are wrapped together, and heated by the blowpipe, they combine with incandescence—(Fox, Ann. Phil., xiii, 467.) The alloy of *cadmium* and platinum is white, granular, brittle and easily fusible: heated till the excess of cadmium is expelled, it contains 100 *platinum* + 117 *cadmium*—(Thomson.) The alloy of *cobalt* and *platinum* is comparatively fusible. With its weight of *nickel*, platinum forms a pale-yellow alloy, susceptible of a high polish, and obedient to the *magnet*. *Copper* and platinum form alloys, the ductility and color of which vary with the proportions. Platinum easily destroys the color of copper; this compound has been recommended for the mirrors of reflecting telescopes; an alloy of 7 platinum, 16 copper, 1 zinc, resembles gold in color—(Cooper, Quart. Jour., iii, 119.) *Lead* and *platinum* form brittle alloys, not entirely decomposed by cupellation—(Dumas.) *Antimony* forms a gray compound with *platinum*, partly decomposed by heat, and entirely by roasting; these metals enter into ignition when they

combine, in the same manner as *tin* and *zinc*—(Fox.) *Bismuth* and *platinum* form brittle alloys, not entirely decomposed by cupellation—(Lewis.) *Arsenic* and *platinum* form a dark-gray, brittle alloy. When particles of arsenic are placed upon red-hot platinum-leaf, they immediately fuse a hole in it. When 2 parts of *platinum*, 2 of *arsenious acid*, and 1 of *potassa*, are fused together, a compound of 89 *platinum* and 10 of *arsenic* (1 atom of each,) is obtained: its density is 16.4; it is fusible at a red heat, but the whole of its arsenic cannot be expelled by heat. Equal parts of *molybdenum* and *platinum* melted into a hard, brittle mass: when the proportion of platinum was increased, the fusion was not complete—(Hielm.) *Mercury* amalgamates difficultly with *platinum;* a compound of 63 of *mercury* and 37 of *platinum* is a soft solid; *spongy platinum* forms the readiest combination; this amalgam adheres readily to the surface of glass. *Silver* and *platinum* form fusible and ductile alloys; when the silver predominates, they are soluble in nitric acid; by boiling sulphuric acid the silver only is dissolved. When the alloy is kept in fusion its components have a tendency to separate. *Gold* and *platinum* require a strong heat for combination, and the color of the gold is greatly deteriorated, even by one-twenty-second of platinum; an alloy of 4 of *platinum* and 1 of *gold*, nearly resembles *platinum* in color; the gold color does not predominate till it forms eight-ninths of the alloy—(Hatchet. Klaproth.)

[To be continued.]

ARTICLE II.

Mechanical Dentistry. By JOHN LEWIS, D. D. S., Buffalo, N.Y.

As the usefulness and beauty of artificial teeth depend on their being rightly constructed and properly adapted, it should be the object of the dentist in the application of a substi-

tute for the natural organs, to secure the attainment of these ends; and with a view of aiding the young practitioner, I will give a description of my method of procedure, which, in some respects, is peculiarly my own; and in submitting it to the examination of the profession, I believe it will be generally approved; at any rate, I am willing it should be taken for what it is worth.

Condition in which the mouth should be for the reception of artificial teeth.—In the first place, it is necessary that the mouth and the gums should be in a proper condition to receive teeth; and as this is a subject of controversy, I will briefly explain what I consider a proper condition. In applying a full set, it is necessary that the gums should be in a healthy condition, the gums presenting no inequalities on the surface, especially if part of the teeth have been extracted a much longer time than the others; but if all or nearly all have been removed at the same time, an artificial set can be applied immediately, as I shall demonstrate in a subsequent part of this article; but not a permanent set.

Dentists who have practiced any length of time are aware, that it is often required and always desirable, to apply artificial teeth immediately after the extraction of the natural organs. It is desired on account of the alteration of voice, which almost invariably follows the loss of the teeth, as well as of the difficulty of mastication, to say nothing of the loss of beauty, and that pleasing expression of countenance which a beautiful set of teeth invariably give. Under such circumstances most persons requiring artificial teeth are willing to incur the additional expense of a temporary set, that can be worn without great inconvenience, until the mouth is in a proper condition to receive the permanent ones; and this is a matter easily accomplished, when done in the manner as hereafter described.

The dentist is often desired to furnish a dental substitute, when there is one, two, or more teeth remaining in the jaw; for example, the cuspid teeth, which very often remain, when all the others are gone, the practitioner contenting himself with a simple remonstrance, often consents to gratify the wishes of

his patients, although well knowing, at the time, that such substitute will never fulfill the design for which it is intended, as well as it would if the natural teeth were all out. Such practice is reprehensible in the highest degree; such remaining teeth should be first extracted, then artificial teeth will be of much more use to the patient, and present a much better appearance in the mouth. It is seldom that artificial teeth applied without this precaution, can be worn any great length of time; for the one or two remaining natural teeth standing alone, with the artificial substitute, impinging upon them, soon loosen or become diseased, and have, ultimately, to be removed.

Taking an Impression of the Mouth.—When it is ascertained that the gums are in a condition to receive teeth, I proceed to take a cast or impression of the mouth. For this purpose, many dentists use plaster, but I prefer wax; and am decidedly of the opinion, that a much better impression can be taken with it than with any other substance now in common use; and it is evident, that wax is much more convenient for the operator, and more agreeable to the patient, than plaster. The cup or instrument to hold the wax, now in common use, is positively not fit for the purpose. It is impossible to take a good impression with it, without using so much wax, as to be very disagreeable to the patient. It is also unwieldy and unhandy; and with it, the operator is very liable to cut and lacerate the gums. With a little practice, and proper care, with those which I construct for the purpose, one can scarcely fail to obtain a correct impression; and as every dentist can easily make them for his own use, I will briefly describe the manner of constructing them. Take britannia metal of one-sixteenth of an inch in thickness, cut it to the required shape, then take a plaster model, cover it with wax to any desired shape or size; mould it in sand and get a metal model and counter-model, between which, stamp the britannia plate, in the manner as gum plate for teeth is stamped. Trim it, leaving it of a sufficient height, letting it run back as far as necessary in the roof of the mouth, then cut a wooden pattern for a handle, plain or otherwise, as suits the fancy, from which, cast a britannia duplicate, to be soldered to the front of

the cup, for the better convenience of holding it while taking the impression. Of these, several different sizes are required for each jaw, so that one of suitable dimensions for any impression may be at hand.

FIG. 1.

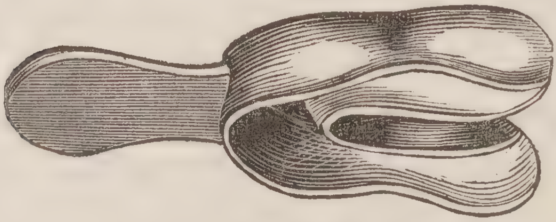
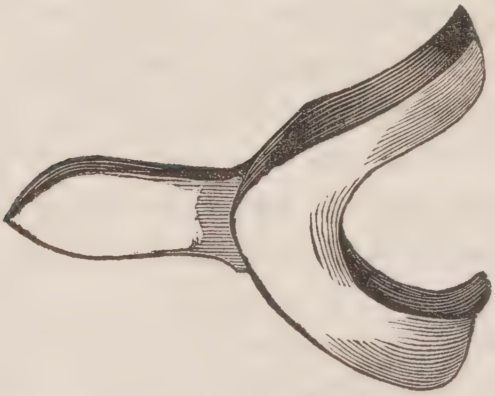


Fig. 1, represents an impression cup for the upper jaw; made in the manner as just described. It should be as near the size of the alveolar border of which it is desired to take the impression as possible, then it will not require a redundancy of wax.

Figure 2, represents an impression cup for the lower jaw, which should be as near the size and shape of the particular jaw for which it is intended as possible. The figure represents a cup, suitable for taking an impression when the natural teeth are all gone, and the gums in a proper condition for receiving a substitute, but where part of the natural organs are remaining, the cup should be much deeper than is here represented. In such cases, it should be deep enough to cover the alveolar ridge without coming in contact with the remaining teeth.

FIG. 2.



The cup, before the wax is put in it, should be smeared with oil, so that the wax will leave it readily; and also move about in it easily. The wax should be made very warm, and worked in the hand until no lumps can be felt in it. Care should be taken not to put too much in the cup, for if there is more in it than is absolutely needed, it will protrude over the edges and be likely to have its shape altered while taking it out of the mouth, thereby spoiling the impression. The impression should be warmed before the wax is put in, to keep the latter soft and plastic while the impression is being taken. The wax,

too, if oiled previously to use, will more readily adapt itself to the inequalities of the mouth, a desideratum of the utmost importance.

In models for parts of sets, it requires, as I have before said, deeper cups and more wax, or the teeth will strike the bottom of the cup, rendering it impossible to obtain a perfect impression. The operator can easily tell, on examining the mouth, if the cup is of the right size and depth, and the amount of wax required, before taking the impression. The operator should stand at the back and right of the patient while taking the impression, holding the cup firmly with the right hand, with the middle finger of the left opposite the centre of the roof of the mouth, if for a full set, or otherwise, according to the circumstances of the case. He should press it easily, but firmly on the jaw, until the alveolar ridge, and as much of the other parts of the mouth as is necessary, are completely imbedded in the wax; he should then remove it slowly and with great care, using the precaution not to move or alter the shape of the wax. The impression should then be carefully examined, and if it is not perfect in every part, the operation should be repeated.

Water should now be poured into the impression to expel the air from the indentations made by the teeth, or any other inequality. Now, take a piece of zinc or tin, about three inches wide, and as long as may be required to surround the impression, leaving a space of half an inch or more between the wax and cup and hoop, then take calcined plaster and mix it with water to about the consistence of batter, (Novia Scotia plaster is the best, as it sets harder and quicker than any other,) and pour it on the impression, filling it and the hoop. The plaster should be mixed as expeditiously as possible, in order to have it set quickly and firmly; and if necessary, the process may be expedited by mixing it in warm water. It will generally consolidate sufficiently in about five minutes, when the wax may be taken off and the model trimmed. If the model is for a full set, the wax can be taken off with a knife or other suitable instrument; but if there are teeth on the model, it should be placed in a proper vessel and the wax slowly melted from it;

for, when separated in any other way, there is danger of breaking the teeth from the model. When the wax is removed the model should be trimmed, beveling from the gum outwards, so that it will draw easily from the sand.

Manner of Obtaining a Metallic Model.—The sand to be suitable for moulding, must have sufficient moisture in it to pack well, otherwise it will not work; if it is too dry, it will not draw, and if too wet, it will "blow." I use zinc for my models, as it is the best metal for that purpose, when pure, that I have ever used. I use lead for my counter-models, but care must be taken not to have it too hot; for if there should be a soft spot in the zinc model, they will fuse together. In order to make the plaster model draw from the sand easily, without bringing any of the sand with it, it should be brushed with powdered charcoal until the surface is perfectly dry, leaving it slightly covered with coal dust, when the sand is packed around it; this is absolutely necessary, especially when there are teeth on the model, or the sand will not draw from the interstices between and around the teeth. After the model is perfectly trimmed, I place it upon a small board in my box containing the sand, which has been sifted through a fine wire sieve, to remove any gravel or lumps which may have been in it, and then place a hoop of wood or tin (as may be convenient) around it. The hoop should be several inches in diameter, and three or four inches in height. I then pack this full of sand around the model, not packing it so hard but that it will yield a little by slightly tapping the model. I now place another board upon it and turn it over, and then carefully remove the model, after driving a sharp instrument of some kind into it, which enables me to do it more conveniently. Any loose sand which may have fallen into the mould can now be removed by holding it up and blowing into it. Melted zinc should now be poured into the mould, in as careful a manner as possible, pouring it into the back part, or wherever it is not desired to cover the model with the plate; for if poured directly upon such part of the model, it may displace some of the sand and spoil the model. After the zinc model becomes cold and hard, cover it with sand, and then

turn it over, after placing the board upon it to keep the whole in its proper place; then remove the sand from the face of the model, and as far up the side as may be necessary to give it the requisite strength, using the precaution to remove the sand from the part representing the gum and the palatine surface, as well as from around the teeth, if there are any. If this is neglected, it will be more difficult to stamp the plate into its proper shape and secure a perfect adaptation. The melted lead may now be poured upon the zinc model, to which it will accurately adapt itself, forming a perfect counter-model, if the requisite care has been taken to have the lead of the right temperature; if it is too hot it will be likely to fuse the surface of the zinc, and unite the two so that they cannot be separated, or at least so as to spoil the model.

Manner of Alloying Gold for Bases for Dental Substitutes—Thickness and Construction of Plates—Thickness of Standards or Backings for Artificial Teeth, how Shaped, and Solder most proper to be employed for Uniting them to the Base.—It is, I believe, conceded by nearly all, that gold is preferable for a plate or base for artificial teeth, than any other metal, or at least for general practice. I know that platina is sometimes used and preferred, but it is very difficult to procure it, and cannot be worked to as good advantage. On this account the writer confines himself to the use of gold and silver. He would observe, however, that the manipulations in platina are substantially the same as will be described for the other named metals. Gold, in its pure state, or of the fineness of American coin, is too soft and pliable for a base; it is, therefore, necessary to alloy it with some metal to make it of the desired stiffness, and still leave it in a condition not to be acted upon by the fluids of the mouth. The question now is, what is the best alloy for that purpose? A great many have been used. My method of alloying gold is as follows: Take one part of copper and two of silver, and melt together. With four grains of this, alloy twenty-four grains of American gold. This produces a metal sufficiently pliable, and one which is in every respect just what we want for our purpose. The writer usually

takes three cent pieces for his alloy, as these contain about the right relative proportions of copper and silver. A sufficient number of these to reduce the gold to the desired standard may be added to the coin, and the whole put in a common crucible, then add a little borax; this is necessary to make them fuse together in a proper manner. Place the crucible in a furnace, or if this is not practicable or at hand, a good hot charcoal fire will answer the purpose. It should remain in the fire until the gold comes to a white heat, when it may be removed and poured into an ingot mould of the proper size and shape. The writer uses ingot moulds of different sizes, according to the amount of metal he desires to cast, but all of them have the same thickness, say the sixteenth of an inch. They should be made of iron, and before pouring the metal in, the mould should be heated and well oiled with sweet oil, to secure a smooth ingot and leave the mould readily. If the metal is poured in when the mould is cold it will be chilled as soon as it comes in contact with it, and the ingot will not be of uniform dimensions, and when this is the case, the plate, when it is rolled down, will not be perfect. When it is desired to get out a small quantity of gold—say enough for one set of teeth—it can be done in a much shorter and easier way, and one which the writer greatly prefers, as a general thing, to the other.

FIG. 3.

Take a piece of pine charcoal and place it upon a soldering frame, such as is represented in Fig. 3, to which it is confined by wires passing around it, and through small holes in the edge. A cavity as large as may be necessary is scoped in the charcoal. In this place the gold and alloy, with

enough borax to make it fuse together freely; another piece of coal is placed over this so as to cover about two-thirds of it over. The flame from a spirit lamp is directed upon the metal with a common blow-pipe, keeping up as regular a degree of heat as possible, until the metal melts and becomes white. Then remove the upper piece of charcoal and place the flat face of a heavy hammer upon the metal, letting it bear as heavily as may be required to make it of the desired thickness. In this manner the gold is not brought into as regular and uniform shape as in casting, it is true; but if care is taken in forming the cavity in which it is melted, it can be brought into very good shape; in fact, into almost any shape which may be desired; for, if the charcoal is clear and good, it will burn but very little, while melting the metal. The cavity in the coal should be made of an oblong shape.

A spirit lamp and common blow-pipe, when they can be used without injury to the lungs, are much to be preferred to any other soldering fixtures now in use. The lamp should be large enough to hold a half pint or more; the shape is immaterial, excepting that it should have a spout coming from the bottom, three or four inches long and three-fourths of an inch in diameter. The end of the spout should be on a level with the top of the lamp; and it should always be filled with the wick, or the flame will be liable to extend into the body of the lamp, setting fire to the fluid and cause an explosion, which, if not very dangerous, can be easily avoided by observing the above precaution.

FIG. 4.

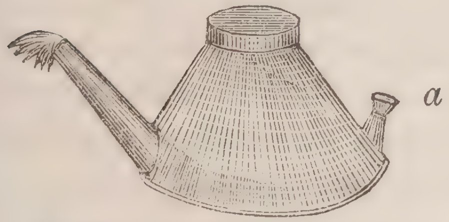


FIG. 5.

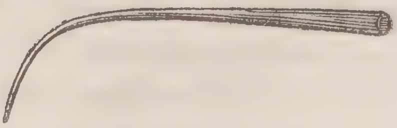


Figure 4 represents a lamp of this kind, which, for shape and use, is as convenient and suitable for this purpose as any that can be employed. It has a small spout at letter *a*, for the better convenience of emptying it at night, or any other time when it is not in use; for if this is not done it cannot

stand long without the alcohol evaporating. This lamp occupies but a very small space, and can be set on the table directly by the side of the operator, rendering it unnecessary for him to move to anneal the plate while stamping it up. It is low, and of such a shape that it is not easily upset, and in every respect is better adapted for a "mechanical" dentist than any other.

The blow-pipe should consist of a simple tube, gradually growing tapering towards the end, and curved as in figure 5. This can be made with a joint, so as to change the points; or it would be still better to have two or three blow-pipes, with different sized orifices; because it is necessary to have a larger orifice in melting down or in soldering a large piece of work, than in a small piece where it is desired to direct the flame, into a small aperture, as is often required in repairing a piece. If the blow-pipe is of brass, it should have a mouth piece of silver, to secure the lips, &c. from the peculiar effects which brass has upon them. With a lamp and blow-pipe of the description above given, one can execute a piece much quicker, better, and with less fatigue than with the "compound blow-pipe and lamp," or any of the "labor-saving machines" now in use.

After the gold has been brought into proper shape to reduce to plate, proceed to get it out, by passing it through a mill, such as is commonly used for this purpose by gold beaters and dentists generally. The rollers are of polished steel and very hard, and worked by a crank attached to each end, or by a single crank with cogs connecting the rollers; these are better for the use of one person, or in getting out a small piece of gold. The mill which the writer uses for this purpose, is made by J. Lodge & Co., Philadelphia, with cogs connecting the rollers, so that one person can work it. It can also be used with two cranks, when required for milling a large piece, where a greater amount of pressure is needed. The rollers should be kept at an equal distance from each other at both ends, and should be brought a little nearer together every time the gold is put through, by means of the set screws, at the top of the mill. The gold should be kept well annealed during the process of rolling or it will crack, and when the plate is of large size, it

should be rolled backwards and forwards in the centre, several times, each time it goes through the mill; othewise the ends will become thinner than the centre, and when this is the case they are liable to split or crack. By following the above directions the plate will be kept of a uniform thickness throughout, unless the gold is of inferior quality, or has not been properly treated. In this case, it will be necessary to remelt it, and when this is done, if it should crack or be flawy, the ductility will be increased by throwing into the crucible, when the metal is fused, a little sal ammonia; if it should not then work well, a little nitre should be thrown into it when melting the next time. The desired result will often be more certainly obtained by throwing into the melted metal a little nitre and sal ammonia at the same time, but the remelting will not unfrequently remedy the difficulty.

For determining the thickness of the plate, a common wire guage with thirty-one holes may be used, rolling the metal down for a plate for a full upper set until it goes into number twenty-five. The thickness should be varied according to the size, shape, and condition of the alveolar arch. When the roof of the mouth is deep and the gums in a healthy and good condition, it may be thinner than this, but a thicker plate is often required, especially for parts of sets, and when the palatine arch is very shallow. For the lower jaw, a much narrower base being required to prevent it from springing, the plate should be thick enough to fit tightly in twenty-two, leaving the edges of the full thickness of the other parts of the base. The alveolar ridge and gum of the lower jaw are of such a shape as to render the application of a dental substitute here altogether more difficult than for the upper jaw. The mucous membrane and muscular attachments of the former are loose and liable to be moved by the motions of the jaws, and to displace the piece. This tendency is almost always felt, and cannot be overcome but by wearing the plate constantly in the mouth, until the gums become firm and the loose integuments cease to act upon it, which, if the adaptation is perfect, will ultimately be the case.

The writer has, in several cases, encountered obstacles in the upper jaw, where the action of folds of mucous membrane and muscular attachments, whenever the jaws or lips are moved, displaced the piece, and where the difficulty could only be overcome by cutting out portions of the plate. But it is impossible to point out all the difficulties and give specific directions with regard to the manner of overcoming each. It is impossible to lay down rules that will apply to every case, and hence, the judgment of the practitioner will oftentimes have to determine the means most proper to be employed.

The views of the patient, with regard to the manner in which the piece is to be constructed, is sometimes opposed to the experience and judgment of the dentist. For the purpose of having it as light as possible, he sometimes insists upon having the plate too thin to sustain the force to which dental substitutes are ordinarily subjected. To have the plate thick enough to secure the requisite strength, and prevent the edges from cutting the parts with which they are in contact, has long been a desideratum with mechanical dentists. Many ways of thickening the edge of the plate have been proposed and practiced; some cut a narrow strip of gold and solder it around it; others double or roll the edge over upon itself, but none of these methods answer a very good purpose. They have been tried, and, I believe, most of them abandoned. The writer has a better method, one which he has practiced for several years with complete success; and one which, when generally known, will, he thinks, be universally practiced. It consists in making a hollow wire, or small tube, with a section of it removed. Take a piece of pure gold or American coin, as it is required to be very ductile to get it into the requisite shape; cut a strip off of a five dollar gold piece, about one-sixteenth of an inch in width; this by a little hammering will become a wire of two or three inches in length, which draw through a common wire plate, making it smaller and smaller, keeping it well annealed during the operation, until it will go into number eighteen of the wire guage; then anneal the wire, and run it through the rolling mill, flattening it down to number twenty-seven; it is then a uniform

strip of gold, between one-eighth and one-sixteenth of an inch in width. This done, take a sufficiently long piece of steel wire, about number twenty-five, around which double the end of the gold strip, and then draw the two through a large hole in the wire plate, the strip partially wraps itself around the wire; this is continued through successively smaller holes in the plate, until it will pass number eighteen. The steel wire can then be removed, through the opening between the edges. The gold wire may now be drawn through smaller and smaller holes until the edge of the plate fits tightly into the groove in the wire. The latter is then annealed, to make it bend easily to the inequalities of the plate, to every part of the edge of which, after it has been properly fitted and reduced to the right size, it should be accurately adjusted. This done, it is confined with small annealed iron wire, and then soldered. But for this, very little solder will be required if the wire is properly made and applied, as it will fit almost perfectly the edge of the plate. A grooved wire soldered around the edge of a plate makes a base very strong and durable, and capable of receiving a beautiful finish, besides, it is lighter; as the plate can be made as thin as number twenty-seven, and still be stronger and less liable to spring than a plate of the thickness of number twenty-five in guage-plate without the binding.

The gold plate for the standards or backings to the teeth, should be as thick as number twenty-three, to be of sufficient strength to support the strain which comes upon the teeth. Each backing, however, should be beveled off towards the approximal and cutting edges of the tooth at the base, where it is to be soldered to the plate it should be left the full thickness.

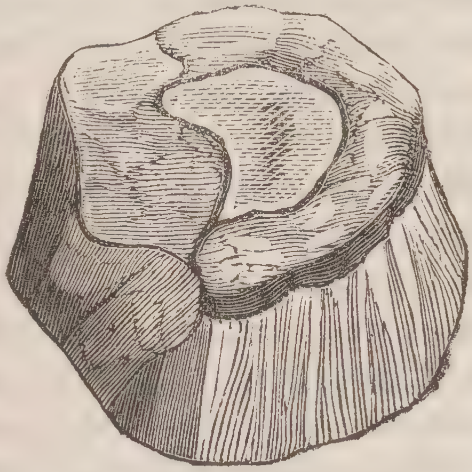
In the majority of cases, the standards are so light that they are continually breaking, and then, in mending them, others are melted and the teeth broken, to the great injury of the entire piece; for there is always liability of injury to a set of teeth to subject them, after having been worn, to a sufficiently high degree of heat to melt solder, especially, if the solder is of the requisite fineness. It is partly for this reason, that the writer prefers and applies standards to teeth, in the manner to be hereafter described.

The solder should be of a quality to flow at a considerable lower temperature than is required to melt the plate, and still be fine enough as to prevent being acted upon by the fluids of the mouth. In making solder, the writer uses the scraps cut from his plate, as he always knows the quality of the gold used for this; his solder is composed of one part brass spelter and seven of gold scraps fused together. He then rolls it down as thin as number twenty-four, and cuts it into short strips, it being more conveniently placed in this form than any other; and it should always be the object of the dentist to use as little solder as possible, as this is more liable to be acted upon by the saliva, if it is not very pure. For silver solder the writer uses one part of spelter to four of silver, melted together, and made into the proper shape for convenient use, using no more, however, than is necessary to put the work together in a permanent and substantial manner.

Manner of Shaping and Stamping up a Plate.—Having premised thus much, I will proceed to describe the method of procedure which I pursue in getting up a plate. Take a piece of paper, and cut a pattern which will cover such portions of the model as it is desired that the plate should occupy. Some dentists use sheet lead for this purpose, but it is immaterial, so that a correct pattern is made. I prefer paper, because it can be pressed into all the inequalities of the model, and again straightened out without altering in the least its size and proportion; lay this pattern upon the gold, and with some sharp pointed instrument, trace the outlines of it upon the plate, then with a heavy pair of shears, or snips, as they are commonly called, cut out the piece of plate so marked, and after annealing, bend and adjust it with a hammer, and different shaped plate pliers, as near as possible to the metal model. Now place it between the metal model and counter-model, and with a heavy hammer, proceed to stamp it into shape. It will be better to remove it now and then, to ascertain if it retains the right place; and by cutting here a little, and bending there a little, it will be swaged into its proper place and shape, without danger of cracking. It should be annealed several times during

the process of stamping. If this is not done it will be liable to spring and rock upon the model in soldering the standards to it. The cavity should be formed in stamping the plate, and this is done in the following manner. Take a piece of card board, and cut it into the desired shape and size for the cavity; of these a sufficient number may be cut to make the cavity as deep as may be necessary. Each succeeding one should be cut somewhat smaller than the preceding one, and then placed upon the model as represented in Fig. 6, with the first or largest one next to it. A thin coating of wax is placed between every two, as also on the side of the whole next to the model, to make them adhere to it. These are placed upon the metallic model after the plate has been partially swaged, but before it has assumed its proper shape. Thus adjusted, the process of stamping is completed with a few blows of a heavy hammer. A cavity formed in this manner, is as easily made, and answers every purpose equally as well, if not better, than those commonly used. Different methods have been adopted for forming a cavity. It is sometimes done by placing a piece, of the right size, shape and thickness, of wax on the plaster model, at the place required for the cavity. But the first method is preferred by the writer, as it leaves the impression and model in the precise shape of the mouth; and this is sometimes necessary, for we often wish to know the exact shape of the mouth, where the cavity is placed. Some suppose, that the cavity is formed expressly for the purpose of a vacuum to hold the plate up and in its place; but this is not the only object to be fulfilled by it, it keeps the plate from riding upon the roof of the mouth, when the palatine mucous membrane is inflamed and in a thickened condition. But after the irritation, sometimes occasioned by the plate when first applied, subsides, it seldom happens that there is any trouble

FIG. 6.



in keeping it up, even if there be no cavity in the plate. The truth of this observation has been verified by the writer. He has noticed, that where small cavities had been formed in the plate on the inside of the teeth, the slight swelling of the mucous membrane of the palate render them useless, and caused the plate to drop. In similar cases, with a cavity formed in the manner as described, there has been no inconvenience, unless the swelling has been very considerable. I am satisfied, however, that the cavity is not required to keep the plate in its place; for I have observed that it fills entirely up with loose spongy structure, caused by the tendency of the mucous membrane to fill the vacuum, without causing the least trouble or inconvenience to the patient; as in every case it kept its place equally well, although it is not to be denied, but that the cavity is sometimes a help in keeping it up; especially when the piece is first applied, and this is the time it is most needed.

While stamping the plate, it should be trimmed to the proper size and shape, letting it extend back as far as practicable, so that it can be worn with ease and comfort by the patient. It should be scalloped out in front at the median line to admit the frænum of the lip, covering the alveolar ridge, exteriorly, as far as the gums extend or the case will permit. If it is desired to bind the plate, it should now be done, adjusting the hollow wire upon the outer edge, and soldering as before directed. The wire should not be applied to the edge of the plate across the plate, as it would be unpleasant to the patient, and it is not required to give strength to the base. The wire having been put on and soldered, the plate should be again swaged to restore its perfect adaptation to the model.

If the patient is at hand, or it is thought necessary, the plate should now be tried in the mouth, to ascertain whether its adaptation is perfect, for, if it is not, the different operations will all have to be repeated; but this is so seldom necessary that the experienced practitioner may proceed at once to attach the front standard to its place, before trying the plate in the mouth.

The base is now ready to receive the teeth, or rather the backings, as in the writer's method of constructing dental sub-

stitutes, these are all secured to the plate before the teeth are attached. His manner of doing this, and applying the teeth, constitutes what he believes to be an important improvement upon the methods usually practiced. It is as follows: Take a strip of gold, of the width required by the length of the teeth, and long enough to support the incisors and cuspidati, the exact length is not required, as it can be cut off after the teeth are fitted, nor is the exact width material, although it would be better to be somewhat wider than is necessary, so that it can be trimmed when tried into the mouth. The proper length of the teeth can also be determined by the relative length of the standard, lips, &c., in connection with the general physiognomy and appearance of the face. The standard or backing for the six front teeth should be, as before stated, as thick as number twenty-three in the guage plate, to give the necessary strength and durability to the teeth. It may afterwards be beveled off to the teeth without thinning the whole and rendering it liable to break.

FIG. 7.

The front standard, when first cut out, should generally represent a segment of a six inch circle, such as is shown in figure 7. The size of this circle varies in different jaws; in some it is much smaller and in others larger. This should now be bent into the segment of the circle required for the teeth, and the size of which may be determined by the general shape of the jaw and face, and the concave edge filed to fit the inequalities of the alveolar ridge, at the particular place it is desired to attach it to the plate.

FIG. 8.

FIG. 9.

The appearance of the standard is now represented by figure

8, showing it bent and filed to fit the model represented in figure 6.

The operator should carefully observe, while taking the impression and trying the plate, the position and prominence of the gums, and each place on the plate it is necessary to set the teeth. By practice and careful attention, he can, in this way, ascertain by the eye the proper place on the plate for the arrangement of the standard, which will seldom be incorrect. The standard should now be placed in the required position, and securely bound there with small annealed iron wire; it can then be barely attached on to the plate, with a small piece of solder, when the wire should be removed and the plate again tried into the mouth to ascertain if it is in the position required. If there are natural teeth in the lower jaw, these will determine the position, as the standard should shut over the lower teeth, when the jaws come together in the natural way; but if there are no front teeth in the inferior maxillary, its place should be determined by the relative position of the two jaws, taking into the account the restoration of the contour of the face and lips, making suitable allowance for the thickness of the teeth on the outside of the standard. If the standard is found to be too far out, or too far in, or in any way different from what it should be, it should now be broken from the plate, with a pair of pliers; or if it is so firmly attached as to endanger the plate, it can be placed upon the charcoal and the solder melted, when it can be removed with a slight blow with the end of the blowpipe. The standard should now be readjusted, and fastened as before, with solder. The plate should then be again put into the mouth, and the standard having been adjusted to it, in its right position, it should be trimmed to the required length. The median line or centre should now be marked on it with a sharp instrument, to designate the proper place for the central incisors.

The plate may now be removed from the mouth and a notch filed in the standard at the point thus marked, so that if the former should be obliterated in heating the plate, no mistake will be made in adjusting the teeth. The standard should now

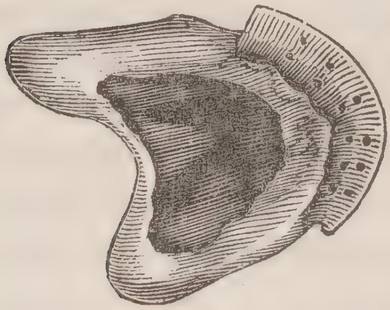
be firmly bound in its place with iron wire to prevent the liability of its being moved, and then permanently soldered to the plate.

Soldering the Standard to the Plate.—The standard having been properly adjusted, borax ground with water should be placed along the line of union, and this can be done best with a camel's-hair pencil. It should be of the consistence of cream, and applied wherever it is desired the solder should flow. If a sufficient quantity is not applied, the solder will not flow freely but form itself into a globule where it is placed, or will simply adhere in a body to the plate. No more solder should be employed than is necessary to unite the backing securely to the plate. The standard having been filed down to the length required for the teeth, the latter may be selected, taking care to have them correspond in shape with the natural organs, and the complexion, and general contour of the face as nearly as possible. If they do not do this they may disfigure, instead of enhancing the beauty of the patient.

The teeth are adjusted to the standard, beginning with the central incisors, by punching holes in it to correspond with the rivets in their inner or palatine surface, and for this purpose a common dentist's punch is used; but it will require some practice to make them in the proper place. The best manner of doing it is to place the tooth upon the plate and standard, as near in the position it should be as possible, and then press it firmly against the latter. This will leave slight marks indicating the place for the rivets. Slight indentations may now be made at the places thus marked with the punch, and the tooth again tried to ascertain if they are in the right place; if so, they can now be punched through and the inside counter-sunk, so as to form a place in which to make a head to the rivet. To do this, a suitable instrument may be used. In adjusting the central incisors, a very narrow space may be left between them, or their approximal surfaces may barely touch, but but care must be taken that they do not crowd each other, and the base of the teeth should be ground until they fit the plate. The lateral incisors should next be adjusted, and these should

be a very little shorter than the centrals, and the cuspids slightly longer, about half the length of the cusp on the end. But as yet the teeth are not fastened, the holes only having been punched and the teeth fitted. Each one, however, will keep its proper position, if the holes are not made too large, a thing which should be carefully avoided. If this is neglected the teeth cannot be securely fastened to the standard. The incisor and cuspid teeth having been accurately fitted, the ends of the standard, back of the last mentioned teeth, should be filed off.

FIG. 10.



The teeth may now be taken off, when the plate and standard will present the appearance shown in figure 10. The next thing to be done is to fit the standards to the base for the bicuspid and molar teeth. A strip of gold, equal in width to the length of the teeth, and of the right thickness. The end is then bent to nearly a right angle, and filed to represent a long triangle, with the point towards the plate. Thus shaped, it will present the appearance as represented in figure 11.

FIG 11.

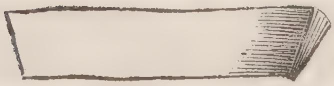


FIG. 12.

This standard will set perpendicular on the plate, and the bent extremity will fit the end of the front standard, which inclines outwardly. The standard should now be bent, forming a slight curve as far back as the first molar, and the edge filed to fit the inequalities of the plate. If it is required, by the difference in the thickness of the molars and bicuspids, there should be another slight, but abrupt curve made in it between the second bicuspid and first molar, which sets in a little farther on the plate than the former. The triangular bend of the standard should be made as wide as may be required by the thickness of the teeth.

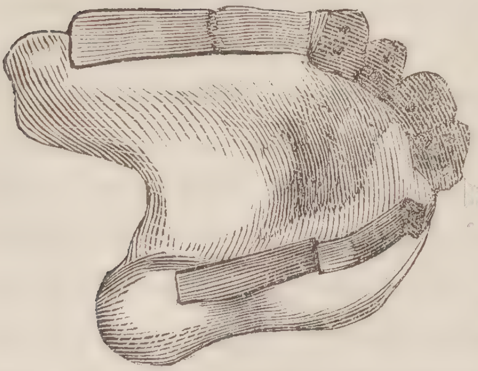
The standard is now ready to solder to the plate, and its ap-

pearance is represented by figure 12. It must first, however, be bound in its proper place, with iron wire, in the manner as before described. The line of union between it and the standard should be first soldered. This done, the standard for the teeth on the other side of the plate should be made, and in like manner soldered; and during this process, if there should be any hole in the front standard, it may at the same time be closed, by flowing a piece of solder into it, when another may be made, using the precaution to punch it in the right place. Each of the side standards should be sufficiently long to support two bicuspid and two molar teeth—this being the number usually employed in an artificial denture, though one less than occurs in a natural set. The alveolar arch, however, contracts after the loss of the natural organs, so that in their replacement a less number are required. The standards having been soldered to the plate, the piece should be boiled in sulphuric acid, diluted with five parts of water to one of acid, to remove the borax, or any other foreign matter which may have collected upon it, during the different solderings and other manipulations. This may be done by placing it with the diluted acid in a copper ladle, and holding it over a spirit lamp until the acid boils, using the precaution that there be no other metal in the ladle with the plate, especially iron, as this would be precipitated upon the gold. If, therefore, the solder has flowed upon the iron wire used for binding the strips of backing to the plate, it should be first carefully removed.

The front standard should now be filed out between the teeth, cutting it down about half their length, and then rounding each separate point behind the tooth into a sort of gothic arch, leaving it as high as may be considered necessary, to secure the requisite strength, and beveling the inner edge down to the tooth. In doing this they should be made to resemble, as nearly as possible, the inner surfaces of the natural teeth.

At this stage of the operation the piece will present the appearance as represented in figure 13. The outside of each standard should now be filed to form a flat surface, on which to fit the tooth, for, if it is left rounded, it will be difficult to rivet

FIG. 13.



the teeth in such a way to prevent them from rocking, which, if not guarded against, would cause the rivets, in a short time, to break. Each of the six front teeth may be tried on separately, and if they do not fit accurately, they should be ground until they do. If they crowd each other, they may be ground a little on their sides also, so that they will stand entirely separate from each other; or at any rate, so as not to press one against the other, as this would be likely to cause them to break while riveting to the standard. For grinding, a small corundum wheel, turned in a light foot-lathe, may be employed, and with an apparatus of this sort every resident dentist should be provided.

After the front teeth are fitted, they may be riveted to the standard. This is done by placing the tooth on the lead model, and hammering the end of the rivets into the hole countersunk for that purpose, forming a head on the rivet, in such a shape that it can be burnished down smooth with the standard. For riveting, a very small light hammer, with one end shaped like a wedge, similar to the riveting hammer used for other purposes, but with the riveting end longer than usual. When the front teeth are all secured in the manner as here described, the piece should be again tried into the mouth, and the back standards trimmed to their proper length. If there are teeth in the lower jaw, the patient should be kept at hand, so as to repeatedly try the work into the mouth, to enable the dentist to select such as are of the right length and shape; but if lower teeth are to be supplied, he should be governed in this matter by symmetry and proper proportions, antagonizing those of the lower jaw with these. The bicuspid and molar teeth may be a shade darker than the incisors and cuspids. The second should be a little larger than the first.

The holes for the rivets of the molar and bicuspid teeth may now be punched and countersunk, as in the manner as before described; and the teeth when properly fitted, riveted to the

standards, and the heads properly burnished. When all are properly secured, the standards should be filed off even with the inner edges of the teeth, and as far down between them as possible. But previous to this, the plate and standards should be made as smooth as possible, removing all superfluous solder with scrapers and gravers of different shapes and sizes, preparatory to polishing, the manner of doing which will hereafter be described.

FIG. 14.

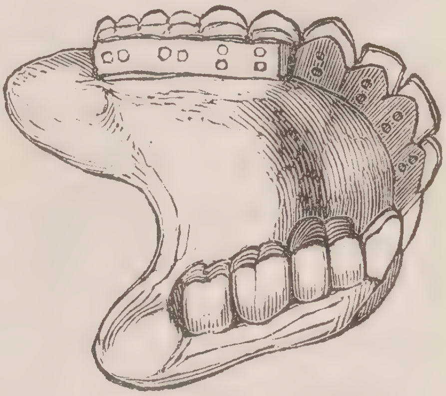


Figure 14 represents a piece at the foregoing described stage of the operation, the molar and bicuspid teeth, however, being of a somewhat different shape from those represented in the cut which was taken from a set made as here described, but with teeth manufactured some years ago; it being only intended to show the manner of mounting.

In the construction of a dental substitute for the lower jaw, a somewhat different method of procedure is adopted, the manipulations however being principally the same. In the first place, the plate should be much thicker than that for the upper jaw, fitting tight into about number twenty-two of the plate guage, if its edges are not to be bound with hollow wire, and the advisability of doing this should depend in a great measure, in fact entirely, on the shape of the parts upon which it is to rest. When the alveolar ridge is very flat and narrow, a thicker plate will be required to sustain the pressure which will naturally come upon it, without springing or bending.

In getting out a base for a lower set, a paper is cut and fitted to the model, which serves as a guide in cutting out the plate. This last is annealed and swaged as before described, repeating the operation of annealing and swaging until it fits accurately the model. The plate for a lower set being much thicker and heavier than is required for an upper denture, it will be more difficult to stamp into its proper shape, but if it be frequently and well annealed, it may be adapted perfectly to all the ine-

qualities of the parts. But previously to swaging it should be partially fitted to the metallic model with plate forceps and pliers, and during the process of stamping, it should, from time to time be trimmed until it is reduced to its proper dimensions, and in such a way that the edges shall not rest too firmly on the folds of mucous membrane on either side of the alveolar ridge. The ends of the plate should extend, as a general thing, a short distance upon the coronoid processes.

If there is the least apprehension that the model is not perfect, the plate should now be adjusted to the mouth. When it fits perfectly, the front standard, which usually consists of a straight strip of plate, with the edge filed to fit the inequalities of the base, may be soldered at one or two points, in nearly a perpendicular position instead of projecting as for the upper front teeth, and as nearly in its proper place as can be ascertained previously to being tried in the mouth. When the plate is placed in the mouth, it should shut about one-sixteenth of an inch on the inside of the upper standard, so as to give room for the under teeth on the outside of it. It may now be cut to the right length, and the median line marked upon it. This done, it may be soldered permanently to the plate, unless it should be found necessary to alter its position. In this case, it should be first removed and properly adjusted in the manner as before described. The incisor and cuspid teeth may now be fitted to the plate, and the ends of the standard cut off on a line with their posterior approximal surface. The next thing to be done is to prepare and attach the standards for the bicuspid and molar teeth in the manner as described for the corresponding teeth of the upper jaw, but which as a general thing require to be longer and placed more on the inside of the alveolar ridge, in order to make the teeth antagonize in a proper manner with those of the upper jaw. It is sometimes necessary to have the inner edge of the lower molars to stand in farther than the inner edge of the plate, and when this is the case, the lower edge of the standard must be bent outwards to make it meet the base. When the standards are soldered to the plate, the piece should be boiled in acid, as before described.

When the holes for the rivets in the teeth are punched, the standards may be cut down between the teeth, and beveled on the inside. The teeth should now be fitted and riveted to the standards, using the precaution in their selection to have them of the proper shape, size and color. During this part of the operation, the patient should be present, that the piece may, from time to time, be tried in the mouth, so that they may all be properly antagonized. The teeth being riveted, the piece may be finished in the manner as already described.

FIG. 15.

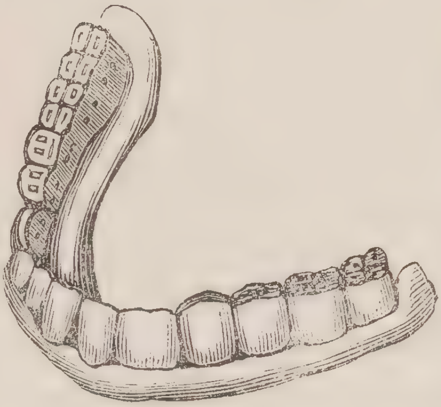


Figure 15 represents a dental substitute for the lower jaw, made in the manner as just detailed. It will be observed, that the front teeth incline a little inwards, it being necessary that they should do so, to bring their edges into their natural position; that is, on the inside of those of the upper jaw.

When it is necessary to have artificial gums, single gum teeth, or block teeth, with artificial gums, may be employed.

A fusible silicious cement, uniting single porcelain teeth to each other and to the base, covered with gum enamel, has, within the last few years, been introduced, to some extent, into practice, but the cement, unless the piece is made very clumsy, and too heavy to be worn with comfort, is liable, by the springing of the plate, to crack and scale off. But gum teeth are only required in those cases where it is necessary to supply the loss of the alveolar ridge, and unless called for, for this purpose, no advantage can be derived from them, therefore, when such loss has not taken place, single teeth are preferable to any substitute encumbered with a representation of gums. When applied under other circumstances, they disfigure rather than improve the appearance of the mouth and face, and are not worn with so much comfort and satisfaction as a denture composed of single teeth. Viewing the matter in this light, I never construct a dental substitute with artificial gums except for cases such as just described.

Construction of Temporary Dental Substitutes.—It often becomes necessary to replace the loss of the natural teeth immediately after their removal, with a substitute that can be worn until the gums and alveolar ridge are restored to health. In doing this, the method of procedure which the writer adopts, is as follows: Take an impression of the mouth with wax made so soft that it will not alter the shape of the gums or cause the patient much pain. If the wax is properly softened, and the impression taken carefully, it can be done as soon as the teeth are extracted, with little inconvenience and pain to the patient.

A perfect impression having been taken, water should be poured into it to expel the air. A plaster model is then taken, and the depressions representing the places from which the teeth were extracted, are filled with wax nearly to a level with the surrounding parts. If there should be other places in the gums represented in the model, from which part of the teeth had been previously extracted, fill them with wax so as to enlarge the model at this place, bringing it into as good shape as possible, for the permanent set. This done, procure the metallic models; after which, remove the wax from the plaster model, which is an exact representation of the alveolar ridge, and to which, after the plate is stamped, it can be bent to fit it, thereby improving its adaptation. The process of getting out a temporary plate is the same as one for a permanent set, except that it should not extend over the alveolar ridge in front any farther than is necessary to serve as a support for the teeth. The outer edge of that portion, upon which the incisors, cuspidati and bicuspids are placed, should not extend beyond these teeth, and in some cases, the writer has found it necessary to cut it off even with the molars. The reason for this is, that the inside of the gums never alter, and the outside, by pressure, can be made to assume almost any shape which may be desired. This is owing to the fact that, in the superior maxillary the alveolar ridge on the inside is principally composed of osseous structure, covered only with mucous membrane; and after it is fully developed, it undergoes but little alteration, while the alveolar border, after

the loss of the teeth, is gradually absorbed, diminishing very considerably in depth and exterior dimensions, and is covered by more soft tissue, capable of adapting itself readily to a vacuum formed over it, and this, if long continued, will remain permanent. In view of this, the author, in adapting a plate, makes it to fit as perfectly as possible on the inside and on the ridge, in order that the gums may assume a good and regular shape. He also makes the air-cavity beneath the roof of the mouth somewhat deeper than in a permanent piece, as the entire plate will rise a very little.

Having properly adjusted the plate, the standards and teeth are attached in the same manner as for a permanent set, making them a little longer than would be proper at first, allowing for the shrinkage of the alveolar ridge. The outer edge of the plate is filed off close to the teeth, as far back as the second bicuspids, so that it may not be seen when the mouth is opened, permitting the remainder to cover the outside of the ridge. In a permanent piece it is sometimes necessary to cut the outer edge of the plate off in front of the incisor, cuspid and first bicuspid teeth, to prevent it from being seen when the upper lip is raised in talking or laughing. There are some cases, however, in which the piece cannot be made to adhere sufficiently tight without covering the entire ridge, and when, from peculiar conformation of the jaw, this happens, the stability and utility of the substitute should not be sacrificed to mere appearance. Teeth applied in this manner should be examined occasionally, and as the alveolar ridge absorbs, the plate should, from time to time, be bent, readjusting the outer edge to the altered shape of the gums.

The writer has, for a long time, been in the habit of supplying temporary pieces in the manner as here described, and many of which are still worn with comfort, and answer the purpose for which they were designed so fully, that the patients consider it unnecessary and refuse to have them replaced, thus showing the advantage and efficiency of this method of supplying temporary dentures, and even in cases where the gums were very ragged and irregular when they were applied. But as a

general rule, temporary pieces applied in this or any other way, cannot be made to retain their adaptation after the absorption of the alveolar processes is completed; the nature of the change is such, in most cases, that pressure on one side will loosen and displace the piece on the other, and besides, the teeth, after a while become too short; but the wearing of a temporary substitute always has the effect of assisting the alveolar ridge to acquire a proper condition for the reception of the permanent piece.

Where part of the teeth have been out a long time, and the gums and alveolar processes around the remaining organs are, as is often the case, very prominent, it is scarcely possible to apply a substitute immediately after the extraction of these. The absorption of the prominent parts would soon cause the plate to lose its adaptation and press unequally upon the parts with which it is in contact, and as a consequence, some of the teeth would be forced out of place. Still, the loss of three or four from different parts of the mouth, no matter how long they may have been out, would interfere but little, if at all, with the application of a substitute immediately after the extraction of the remainder, as the places of the teeth, previously removed, may be built up with wax on the model as before described, and this will aid the gums to acquire a better shape than they otherwise would.

There are other cases in which the application of artificial teeth immediately after the extraction of the natural organs would be manifestly improper, as for example, when the gums are in an inflamed and swollen condition. The plate, in a case of this sort, after the swelling had subsided, would lose its adaptation and could not be worn with comfort, if at all.

Parts of Sets of Artificial Teeth.—The writer will now give his method of applying artificial teeth for either jaw, when only a part of a set is required. The cases, however, of this kind, are so numerous and varied, that it would be impossible to describe the exact method of procedure required for every case which is liable to come up in practice, as scarcely any two are precisely alike. The following description, however, will

enable the practitioner to devise a substitute for supplying the loss of part of the teeth in any case which may occur.

It is scarcely necessary to premise, that unless the wax impression and models are perfect, it will be impossible to replace the loss of any of the teeth in such a manner as to subserve a valuable purpose.

In making a substitute for the upper incisors, a perfect model having been obtained, a paper pattern of the proper size, fitted to the natural teeth as far back as the first molars, or as far as may be considered necessary to give it the requisite surface, and covering the alveolar ridge in front, is made. I then cut my plate by this, and stamp it to fit the model, forming a large air-cavity in the palatine portion as for a plate for an entire set. The plate should then be stamped and fitted around the remaining teeth at their junction with the gums; this is said to be very objectionable by some authors, "because it will irritate and inflame the apices of the gum," but if the plate is made a very little larger than is required to cover the gum, so that when it is properly adapted, the edges will turn down a little on the teeth, it will obviate this objection, and make a much stronger and better plate than can otherwise be obtained. To do this in a proper manner, the plate should be cut considerably larger than is required, and swaged up against the teeth and afterwards filed off, leaving the edge slightly turned down on the teeth, as before described. A backing is now cut, sufficiently long to reach from one cuspid tooth to the other, and fitted to the inequalities of the plate; it is then slightly united to it with solder, giving it such an inclination, as that when the teeth are fitted on the outside, they will fill out the arch in a proper manner. The piece should now be placed in the mouth to ascertain if it fits perfectly, and also if the backing is in the right position; if so, it can be filed to the requisite length, and when taken from the mouth it should be firmly soldered to the plate. The piece should now be boiled in acid, and the backing cut down between the teeth to about one-half their length, or so as not to be seen from the outside. This done, the teeth may be fitted to the plate and backing, and firmly riveted; after

which, the plate should be filed off on the outside, up to the teeth, and the edges made smooth, removing, at the same time, all superfluous solder preparatory to polishing.

FIG. 16.

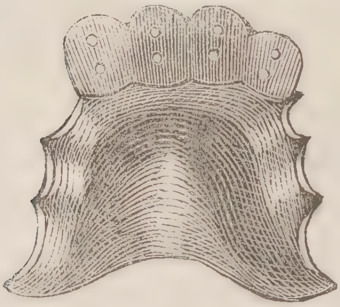


FIG. 17.

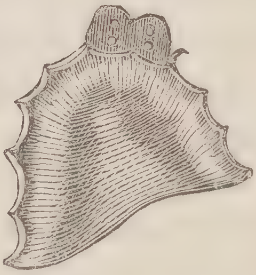


Figure 16 represents a plate like the one just described, after it is ready for the reception of the teeth. It is not necessary to describe the method of procedure in making a substitute for any of the other teeth, it being nearly the same in all as that just detailed.

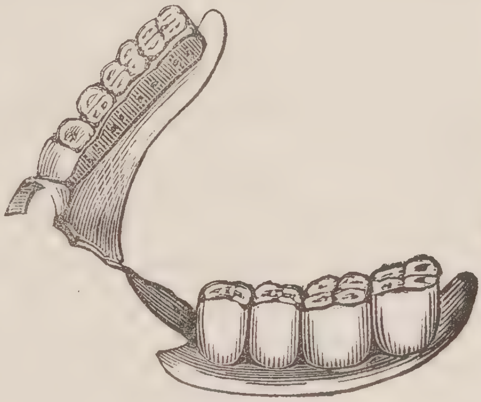
Figure 17 represents a plate with the standard attached for the two left incisors of the upper jaw. It varies but little from the other, except in size and position in the mouth, the manipulations being alike in each. In applying an interrupted partial denture, or where the teeth are scattered around in different parts of the mouth, the procedure is the same as already described, the difference consisting in the shape of the mouth and position of the teeth, the plate being carried over the alveolar ridge, wherever teeth may be required, far enough to serve as a support for the artificial teeth when placed in the vacant spaces where they are required.

When a substitute for the bicuspids on each side is required, or the bicuspids and molars, it is necessary to let the plate cover the whole anterior portion of the roof of the mouth; but cases of this sort are of rare occurrence, especially for the upper jaw, but in the lower they are less rare; and when such substitute is required here, a plate is constructed to fit the back part of the alveolar ridge on each side, extending it back as far as may be necessary, with a narrow strip running across the mouth, immediately behind the front teeth, perfectly adapted to the gums, which should be made somewhat thicker than is

necessary for the other parts of the plate, and this can be done by rolling each end of the plate in the mill, after the whole is of the thickness required for the strip, then cutting out the base with the strip from the plate as thus prepared. Greater thickness for the part passing behind the front teeth is necessary, to give to it the requisite strength. The upper edge of this strip should extend up on the teeth a short distance, as also the plate where it fits around the posterior side of the last remaining tooth on each side, to preclude the possibility of "irritating" or "inflaming" the gum, and to give to the piece additional stability, serving as a sort of clasp. But this is not necessary when the plate can be kept securely in place without it, for it is certainly, in some degree, productive of injury to the teeth which support it. The standards and teeth are all fitted and attached to the plate, in the same manner as for a full set.

Figure 18 represents a substitute of this description, the six front teeth being still in the jaw.

FIG. 18.



It is scarcely necessary to say that the plate should be made perfectly smooth, to prevent it from irritating or abrading the gums and folds of mucous membrane, with which it comes in contact.

For finishing a piece, the writer uses flour of emery with olive oil, on pieces of pine wood, so shaped as that they may be applied readily to all of the irregularities of the plate. The wood being soft the surface is soon filled with the emery, by which the asperities and rough parts may, in a short time, be cut away. When this is done, the piece may be put on a small brush wheel, such as are commonly used for polishing, holding the surface of the plate, whenever required, upon the face of the brush, previously charged with oil and emery. The piece should now be thoroughly cleansed, after which, if it is desired, a beautiful finish can be given to it by using burnishers of dif-

ferent sizes and shapes, fitted to reach every part of the piece. A fine finish can be obtained by using the ordinary brush and chalk that is free from small stones.

The piece is now ready to be introduced into the mouth, which being done, those portions which may not perfectly fit the gums should be bent to do so with a pair of pliers, as also any part which may press so hard upon them as to cause pain, or in any way prevent the perfect adaptation of the plate. The operator should also cause the patient to close his teeth, and those teeth which may strike before the others should be ground off, so that both rows of teeth may strike at the same time when closing the jaws; this is necessary, for if the teeth should strike sooner in one place than in another, it will loosen the plate, and cause the patient much trouble and inconvenience, if it be even possible to wear them at all. Artificial teeth should always be made to antagonize perfectly, for without this, the best fitting plates become useless failures, this is particularly the case in pieces retained by clasps, as the unequal pressure, and rocking will ultimately loosen and destroy the teeth which are clasped, and of course, if continued will certainly destroy the whole denture. A single tooth attached to a suction plate, can be worn with greater comfort, a week after its application, than if fastened to the other teeth; and it can be of no possible detriment, answering every purpose equally well, requiring only careful adaptation of the plate, as well as accurate antagonism with the other teeth. It is greatly to be hoped, that this method will eventually supersede all others, possessing as it does, so many advantages.

The writer has now described his method, of attaching artificial teeth to a continuous backing, and the advantage of this kind of backing over separate standards, as commonly used, are, first, increase of strength, for it will be readily perceived, that when biting upon one tooth, the strain is in part exerted upon all the rest; and, secondly, the continuous standard imparts additional strength to the plate; for with this band passing along and attached to it, it is almost impossible for the plate to bend or even spring, while separate backings afford no support to the

plate whatever; and again, by means of a continuous standard with the teeth riveted to it, we avoid the necessity of heating the piece after the teeth are put to it, which is always productive of injury to them. In other words, it renders them less capable of sustaining the pressure to which artificial teeth are, as a general thing, more or less exposed. Besides, in the process of soldering, they are often cracked or broken.

I have now, in as few words as possible, described the method of procedure which I adopt in mounting artificial teeth, and I am disposed to believe, if fairly tested, it will be found superior to those usually practiced.

ARTICLE III.

Application of Artificial Teeth by the Auroplastic Principle.

NORWALK, CT., *Nov. 9th*, 1853.

DR. C. A. HARRIS:

DEAR SIR—In the October No. of the American Journal, I noticed an article entitled, "Application of Artificial Teeth, by the Auroplastic Principle, by Edwin Truman, Dentist, London."

In referring to this article in your editorial, you observe, "In alluding to the use of gutta-percha as a base for artificial teeth in a former number of the Journal, we stated that we believed Dr. Hill, of Norwich, (should be Norwalk, Ct.,) was the first to test its applicability for this purpose. He informed us by letter, about four years ago, if our memory serves us correctly, that he had then made some experiments with it, which promised the most satisfactory results. We should be glad to hear from him again upon the subject, and learn to what extent his expectations had, by his subsequent experience, been realized."

It will be my pleasure to respond to the wish so courteously expressed in the paragraph just quoted, and I will now proceed

to give the result of some experiments with the substance referred to.

My experiments with *pure* gutta-percha as a base for artificial teeth, were by no means satisfactory. It is too stringy and elastic in its pure state, to be used with much convenience. I therefore made a compound, similar to the article known as "Hill's Stopping"—with which I was much better satisfied, and which I subsequently used as a base for artificial teeth.

With this compound material, my experiments have been chiefly made. My method is as follows: After having secured, and prepared my plaster model, I cut out a rough pattern for a plate, from the compound material, which is rolled out into a sheet about the sixteenth of an inch in thickness. This, I immerse in hot water, when it immediatly becomes soft and plastic. While plastic, I press it with my thumb and fingers where I wish it to go upon the model. Occasionally immersing it in the hot water as it becomes cool, until it is made to take the precise shape, which I desire. It is now to be trimmed, and dressed until the edges are smooth and true.

It is necessary that the alveolar border should be quite thick. This can be easily made so, by adding small strips, until the required thickness is obtained. When this is done, it is ready to receive the teeth, which may be secured as follows:

If pivot teeth are used, (and they can be in many cases with satisfaction,) I proceed as follows: I sit down, with my model before me, with a small spirit lamp lighted at my right hand. After selecting the tooth which I design to use, I seize it with a pair of common pliers and gradually heat it in the blaze of the spirit-lamp, (it requires but little heat,) and then press it firmly in its bed on the alveolar border, just as I wish it to stand when in the mouth. And thus I proceed, until the teeth are arranged, occasionally trying the piece in the mouth, to see that it is all right. Supposing the teeth to be all right in their arrangement, I next proceed with a small flat-smooth pointed instrument to lay the compound all around the base of the teeth, in a solid and substantial manner, occasionally heating my instrument in the blaze of the spirit-lamp, and massing it down.

If ordinary plate teeth are used, they should be lined, or backed in the usual manner for setting on plate, only leaving the backings longer than is customary for soldering on plate, and allowing it to turn out a little from the tooth, so that the compound can cover it, and retain it firmly in its place. This can be done so as to give great strength to the teeth, when properly arranged. All this can be done in less time than it will require to write these directions, save, perhaps, the backing of the teeth.

I suppose the teeth now in use in Dr. Allen's process of continuous gums will answer a better purpose for this kind of work. Such, in short, is my plan of setting teeth, on a compound base. It will be perceived, that any required shape can be given to the gums, and any irregularity in the alveolar ridge easily adjusted. A portion of the compound I prepare of a gum color, and lay it on as may suit my convenience or taste, with my small smooth-flat instrument, heated in the blaze of my spirit lamp. The whole process is very simple, and much easier executed than the method adopted by Mr. Truman of London.

Let us consider the objections to this way of mounting artificial teeth. The objection does not lie on the ground of non-retention of the teeth. If proper care is observed in mounting them, they will bear any legitimate use in mastication. They will also continue useful for several years, as my experiments will show.

But the great objection in my mind is, they will not retain their proper color. I have succeeded in making a beautiful gum colored compound, and can paint them with various shades of the same article, and when first used, look exceedingly well, but they will change color in the mouth, and look bad enough after a little use. If this difficulty could be obviated, I should think much better of the plan. But I see not how it can be, until we can impart to it an enameled surface, which is not likely soon to be accomplished. A flesh colored compound, would indeed be desirable, but I have not yet succeeded in making a gum color that would not fade, or turn dark and livid, under the influence of the action of the fluids of the mouth. A simple compound like the "stopping," operates the best in the long run, of any I have tried.

Temporary sets may be constructed on this plan, with great facility, and at a small expense, answering a very good purpose. Indeed, I should think them altogether preferable to the English bone, or hippopotamus base. And they may be renewed or entirely reconstructed at any time, with little difficulty.

For under sets, this article is peculiarly adapted, inasmuch as it is so easily moulded to any desirable form. And the base can be made so thick and strong, as to endure any service. And the teeth are firmly held in their places by being stuck into the compound when slightly heated, without any other support. It will afford sufficient weight to the piece, and bulk, to any extent. Where one or more grinders are lost, this plan furnishes a simple and economical substitute, as they may be retained without clasps or ligatures.

If thrown back twenty years, I should certainly regard this as a great and useful invention. And even now, it may be regarded as a great convenience for temporary uses. But otherwise, I have little satisfaction in this kind of work, since I have seen the beautiful block and continuous gum work of the present day. As to strength, there is no difficulty; and in some cases it may be made really handsome. But it is not easy to overcome our predilection in favor of the precious metals, as a base for artificial teeth.

I have thus, my dear doctor, endeavored to give you a very brief description of my experiments on the "auroplastic principle," and would be pleased to communicate more specific information regarding it, either to yourself, or any other member of the dental profession, if desired so to do, at any time.

Very truly, yours,

A. HILL.

P. S. I do not understand how gold can be deposited directly on gutta-percha by means of the galvanic battery, as set forth by Mr. Truman, of London. If this can be done, a great point will be gained, as to the success of these experiments, and the principal objections obviated.

Perhaps you can give me some light upon this subject. If so, I would esteem it a special favor.

ARTICLE IV.

Parting Gold and Silver on the Large Scale: being Notes of a Visit to the Chemical Department of the United States Mint in Philadelphia. Read before the Baltimore Academy of Science and Art. By A. SNOWDEN PIGGOT, M. D.

As far as I know, the United States Mint, in Philadelphia, contains the largest establishment in the world for refining the precious metals. A visit to this institution, therefore, is of peculiar interest to the chemist and metallurgist, as he there has an opportunity of witnessing the effects of quantity in influencing the chemical affinities which, from the subject of his daily study, as well as of observing the application of the principles discovered in the laboratory to the great manufacturing processes of the arts. I have, therefore, concluded to give a brief account of the operation of parting, as there conducted, for the opportunity of examining which, I am indebted to the politeness of Prof. James C. Booth.

The chemical department of the Mint consists of an extensive range of rooms in several stories. The distribution of these rooms being a mere matter of convenience, I shall not stop to describe it; neither shall I be guided in my account by any mere architectural arrangement.

The first of the processes is, of course, the fusion of the metals designed to be parted. This is effected in one of Barron's furnaces, of a peculiar, yet simple construction. It consists of a fire-place and two ovens. The fire-place is cylindrical, and is fed from a cylindrical hopper resting upon it, filled with coal. Beneath the fire-place is an air-drum, which receives the nozzles of these blast-pipes. Barron's patent, it will be remembered, consists in a modification of the tuyéres of the blast-furnace. Instead of luting the pipes of the tuyére, so that all the air which enters the furnace must pass through the former, he leaves a small space all around the pipes, between them and

the tuyére. This, it is believed, has the effect of greatly increasing the draught by carrying in a large volume of air outside of the pipes, so that this is a combination of the blast and wind furnaces. In the furnace under consideration, two tubes, one on each side, pass from the central cylinder which contains the coal into the lateral ovens. These, of course, contain no fuel, but are heated by the flame and hot gas passing off from the fire. They are cylindrical, and each is closed above like the common metallurgic wind-furnace, with a tile. The crucible (of black lead) is placed in the centre of the oven.

The proportion, in which the metals are alloyed in this preliminary fusion, is two parts of silver to one of gold. The old proportion was three of silver to one of gold, whence the old name, *quartation*, applied to this process. Pettenkofer considers one-and-three-quarters of silver to one of gold sufficient for all practical purposes.

The metals, thus fused and alloyed, are granulated by pouring them, still in a state of fusion, into water which is kept agitated. Much, of course, depends upon the minuteness of the subdivision effected by this operation. The more complete that is, the more readily will the subsequent separation of the metals from one another be accomplished.

The process of parting adopted here is a slight modification of the old Mexican method. The reason assigned by the chemist for preferring the nitric to the sulphuric acid parting, was the position of the Mint in the heart of the city of Philadelphia. The vapors from so large a quantity of sulphuric acid would be intolerable, and the difficulty and expense of preventing their escape would not be paid for by the increased purity of the silver obtained. He says, also, that he is able to work as closely as necessary with nitric acid, and that his *surcharge* is not objectionable, and that his silver contains but little gold.

The granulations are introduced into porcelain pots, and the residual nitric acid of a former operation, presently to be described, is poured upon them. The acid used make about 38° in Baume's hydrometer. There are 60 of these porcelain pots, holding each about 150 pounds of the alloy, so that the amount operated upon at one time, may be 9000 pounds, consisting of

3000 pounds of gold and 6000 pounds of silver. Usually, however, somewhat less than this, say 600,000 dollars worth of the metal are parted at once. These pots are placed in the draught of a tall chimney, in large wooden chambers, closed by doors which rise and fall on a pulley. This whole contrivance is so well managed, that, although such large quantities of acid are used, not the slightest unpleasant odor can be perceived about the premises.

The pots are heated with steam for 5 or 6 hours each day, and the mass is repeatedly stirred in order to present fresh surfaces to the acid, and to break down the lumps of gold which are left, and which necessarily shield some silver from the action of the solvent. After the steam is shut off, the action continues with great violence, generating a very considerable amount of heat, so that the next day the pots are still warm.

This process extracts by far the greater portion of the silver, leaving not more than 1 or 2 per cent. still combined with the gold. The next morning, after the liquid has become quiet, it is drawn off, and a fresh charge of acid poured upon the remaining metal. This extracts the rest of the silver down to a few thousandths, which it is of no consequence to separate. The gold is now taken out and thoroughly washed with steam-heated water on large cloth filters, and the acid is returned to the pots to be used in a new operation. The siphon used for these operations, is quite large, made of gold, and valued at 3000 dollars. It is annually returned as bullion.

The liquid drawn off from the pots is poured into a large wooden vat, holding from 1200 to 1500 gallons, where the chloride of silver is precipitated by means of common salt in solution. The precipitation being complete, the chloride is drawn off into square filters of coarse muslin. Here it is washed unintermittingly by a stream of water from a hose. It is necessary that this stream should continue to flow during the entire washing. Should it be intermitted, the chloride will sink down upon the filter and speedily become so condensed as to be with difficulty penetrated by the water. The washing is kept up until the liquid which passes through is "sweet," as the work-

men say, that is, till it is neutral to test paper. It is commonly continued till 1 o'clock, A. M.

The washings from the gold, which contain about one-fourth of all the silver, are treated separately. They are conveyed to a lower floor and there precipitated.

The chloride, thus washed, is transferred to four large vats in which it is decomposed, metallic silver being precipitated. This is effected by granulated zinc which is added in excess, the residual zinc being dissolved by sulphuric acid. No acid is necessary to start the operation, the chloride, in such large quantities, acting with sufficient energy by itself and generating considerable heat. I was surprised to learn that the chloride and sulphate of zinc thus obtained were not preserved, the manufacturers of zinc white not being willing to buy them, and the wholesale apothecaries finding enough in one day's results to stock the market for a long time.

The silver thus obtained is washed to free it from all adhering impurities and transferred to a lower floor. Here it is packed into a drum or short cylinder, and subjected to the action of a very powerful hydraulic press, worked by steam. By this process it is of course greatly condensed, assuming a brilliant lustre in places on the circumference of the cylinder, and much liquid runs out of it. Minute particles of silver flow out with the liquid, and a simple but ingenious trap is contrived to save this valuable sludge. A box with compartments, resembling somewhat an old galvanic battery in form, is placed so as to receive the current of water issuing from the press. Each compartment is perforated about its middle with a horizontal slit, so narrow as to permit the fluid to flow out very gradually. In this manner, every portion of the steam is detained some time in each cell, and the metal contained in it, settles down in the first cells of the series, as an impalpable mud. Over the top of the last cell runs the clear liquid entirely stripped of its silver, which has been deposited in the first cells in which it had been received.

The gold resulting from the parting is in very fine powder, almost as minute as though it had been precipitated by sulphate

of iron. It is of a rich sienna-brown approaching to black and leaving here and there a purple stain. It is worked in the same way as the silver by the hydraulic press. The masses coming from this press resemble great cheeses more than any thing else I can compare them to. The gold becomes yellower and the silver whiter, but the latter does not entirely lose its ashen tint except upon the edges where it has been forced against the polished walls of the cylinder.

These cakes, weighing about forty pounds each, are taken up into the melting room, where they are fused and alloyed. For this purpose copper only is used. This gives to the gold pieces a yellow color, which approaches a red instead of that bright brassy yellow which is attained by the mixture of silver and copper in the coin. The difference will be very perceptible, if a gold dollar is compared with an old half eagle.

It will thus be perceived that the operations in the Mint differ little, chemically, from the old process of nitric acid parting. The chief improvements which have been made by the present chemist are the enlargement of the apparatus, to meet the increased demands made upon the Mint by California, and the increase of the facilities for transporting the products of the different operations to the point at which they are needed. All the vessels which contain these, move upon wheels, and arrangements are made for transferring not only the solids, but the liquids from one story to another with ease and rapidity. Hose are provided to supply a constant stream of water for washing.

The closeness with which the metals are worked, may be learned from the annual reports to the Treasury. Much of the burden in the way of parting, &c., now thrown upon the Mint, will, however, probably be taken off by the recently established Assay Office in New York. If that should be well conducted, it may do all the refining of bullion, &c., for private individuals, leaving to the Mint only its peculiar duty of manufacturing the coin of the country and performing the chemical operations therewith connected.

ARTICLE V.

Chemistry for Dentists—A Letter to the Senior Editor.

MY DEAR DOCTOR:

IT cannot fail to gratify those members of the dental profession who are really desirous to see it placed on a scientific basis, to learn that you have determined to introduce a Chemical Department into your Journal. It is well that the oldest dental periodical should take this step. The others probably will soon follow. At any rate, they ought so to do, for as dentists become better educated, mingle more with physicians, and feel the necessity of scientific knowledge, not only to advance their art, but even to retain the position they have assumed as members of a profession which is really a specialty of medicine, they will demand more and more from their teachers, their colleges, their text-books and their journals.

It is to be expected that objections will be made to your course, that sneers will be abundantly thrown out, that small and feeble ridicule will be showered down upon you, but I trust that you will not allow such little things to move you. You have already fought through many innovations, every one of which has redounded to the advantage of the profession, and I hope that you will insist on this with a pertinacity that will bear down this petty and ignorant opposition.

The cry of *cui bono* has already been raised. Hundreds of dentists are unable to see how they can secure more patients and pocket more dollars by possessing a knowledge of chemistry than they could, if destitute of such information. They look at the mere mechanical parts of dentistry and triumphantly ask how chemistry is applicable to them? They can file a tooth, or pull a tooth, or plug a tooth, without any acquaintance with this beautiful science, and that is enough for them. They want nothing more—they will oppose anything more.

But these people do not see that they are retrograding and

carrying dentistry back with them to what it was many years ago. They are reducing it again to a mere handicraft, a series of mechanical manipulations without thought or science, and so undoing all that has been done with so much labor and such zeal, within the last twenty years. The question proposed now to dentists, is: Are you content to rank yourselves with the mere artizans, or will you claim a higher position? Will you enroll yourselves among the liberal professions?

The latter can only be done by making dentistry what its intelligent members claim that it is—a specialty of medicine. The teeth have their physiology, their pathology, their therapeutics, their hygiene, just as any other set of organs have. If, then, we should have aurists and oculists, who are received and recognized as men of science by physicians, why should we not have dentists occupying the same position? But be assured, the medical profession, with its learning, its centuries of progress, its high standing in the world, its extensive scope, its varied acquirements, will not accept any specialists who are not themselves scientific. It regards with scorn any mere mechanical act that claims to affiliate itself with it. The physician would as soon think of meeting his cutler upon terms of equality, as one of these ignorant dentists.

There are dentists, however, who clearly understand their true position. Men of scientific attainments themselves, they appreciate them in others, and know how to avail themselves of those truths which lie, as it were, on the outside of their profession. They see that, in making the claim for dentistry, that it shall be considered a specialty of medicine; they take upon themselves to investigate all the questions of physiology, pathology, &c., that can have any connection with the teeth.

To these men, chemistry is all-important. They wish to learn how the various alterations in digestion may affect the nutrition of the teeth. They must first learn, manifestly, what is the composition of an average healthy tooth; how this varies at different ages, in the two sexes, under different circumstances. They must also understand thoroughly the chemical processes of digestion and nutrition, and must look further into the chem-

istry of the food. The reciprocal action of the teeth and stomach upon one another, is too manifest to need any illustration. Acid matters rejected from the stomach must act upon the teeth. There is, however, a more important relation which needs to be carefully studied and thoroughly comprehended.

Nutrition, in the early periods of life, may be variously impaired. This is manifest from the existence of the various blood diseases. Some of these cachexies are communicated to the fœtus in utero by the diseased blood of the mother. A tuberculous mother gives birth to tuberculous children. The badly organized blood of the parent circulates through the growing tissues and leaves in them its aplastic deposits, or at least the tendency to form them. This morbid condition must, of course, affect all the tissues. The brain suffers, as we learn from the fact that the children of such mothers are extremely liable to hydrocephalus. The glandular system suffers, as shown by the scrofula which so commonly distresses the infancy of these unfortunates. To name no more, the teeth are affected, as every one knows who has paid any attention to the characteristics of a tuberculous diathesis to be found in these organs. Thus we learn, that the nutrition of the teeth is influenced while the fœtus is still in the womb of its mother. The history of such teeth must differ widely from that of those which are perfectly normal in their formation. How are we to learn wherein they differ? Who is to tell us the peculiarity of their composition? The chemist alone. It is to chemistry that we must apply for such information, and if it is not sufficiently learned to answer us, we must direct its inquiries in the proper channel.

Still further, if the food of the newly born infant does not contain the proper proportions of phosphate and other salts, it is very manifest that the development of bones, teeth and nerves will be impossible. We shall have an excess of animal matter and a deficiency of the earths. The consequences of such an error in diet are too manifest to need any explanation. It is clear, however, that there is but one mode to determine this question, and that is to acquire first a thorough knowledge of the chemistry of food.

The food, however, may be sufficient in quantity and suitable in quality, but there may be some derangement in the digestive organs, which will prevent it from being properly introduced into the system. It may ferment in the stomach and produce various compounds, not only innutritious, but actually injurious to the economy. All the organs must suffer from such an unfortunate taint at the fountain head. Here again we need the chemist to explain to us the nature of these alterations of digestion which thus vitiate the nutrition of the whole organism and entail disorder upon every part.

Supposing, however, that these inquires be dismissed as too deep for ordinary investigation, there still remains the important practical fact, that be the causes what they may, there is a marked difference among the different varieties of teeth. Some are hard and resisting; others are chalky and friable. Some decay with great rapidity; others resist the ordinary agents of destruction for the whole time of a long life. The most exclusively practical man will not deny that the recognition of these varieties and the determination of the probable duration of any given set of organs is a matter of the utmost importance. The cause of decay must be either in the teeth themselves or in the secretions and other fluids which surround them, or what is still more likely, in both. Thus a tooth liable to decay will be destroyed by the common acids of the mouth, and a mouth unusually acid will more rapidly corrode a sound tooth. If these two elements of destruction be combined, the progress of disease will of course be much more rapid.

Now, how are we to get any information in regard to this matter? Manifestly from the chemist alone. It is he who must analyze for us the teeth and the fluids around them, and point out to us the composition of either which produces the result under consideration.

But even should this knowledge be considered unnecessary, it cannot surely be urged that the study of the cause of caries is a piece of mere scientific trifling. "Remove the cause and the effect ceases," is an axiom as old as science. Prevention or prophylaxis is based entirely upon etiology. If our ideas of

the cause of any disease be erroneous, our measures of prevention will be futile. Now it is generally regarded as an established fact, that caries is a chemical change induced in the teeth by the action of corrosive agents which surround them.

This view of caries adopted, the question arises: What are these corrosive agents? Let us know them that we may remove them or protect the teeth from their action. This opens up an examination of all the fluids in the mouth with their changes by decay or disease. Foreign substances, which may operate upon the teeth, must also be so analyzed, and their desstructive power accurately measured. Now it is well known that the various articles of our food, during decomposition, generate a great variety of acids, each one of which is a more or less energetic solvent of phosphate of lime, and consequently a destroyer of the teeth. The chemist alone can measure the activity of these agents, and estimate their destructive power, or even determine whether they possess any such power at all. There is a still further question of much importance to the practical dentist. How are these acids effected by the fluids of the mouth? All these questions, the direct practical importance of which it is impossible for the dullest tooth-scraper to avoid perceiving, can be answered only by the chemist.

If we turn to the department of mechanical dentistry we find that it is half made up of chemistry. What causes the occasional crystalline structure of gold, so that it breaks down under the rolls? This surely is a question of some importance to the practical man, who desires to lose neither time nor material. This crystalline compound is exceedingly annoying and it is very desirable to avoid it. It can only be done by understanding the nature of alloys.

Again, it is well known that California gold, directly worked, is not a little injurious to the rolls. This difficulty also exists to some extent in the coin made from this gold. Why is this and how is it to be avoided? The answer to this question must come from the chemist.

Many other questions connected with alloys require the light which chemistry alone can throw upon them. The metals which

render gold brittle, the mode of purifying gold, the separation more especially of tin which is peculiarly troublesome, must all be thoroughly understood before a man has a right to lay claim to the character of a good mechanical dentist, because all of this knowledge is directly connected with the very elements of his art.

Still further, we have a thousand questions connected with the reaction of the earths upon one another, the effect of the metallic oxyds upon each other and upon the earths at the high heat of a baking furnace, the changes in these substances induced by the same heat, the methods of obtaining them in perfect purity, the effects of different impurities in the resulting tints, the modes of detecting adulterations, &c. These points are absolutely necessary to be known by the manufacturer of artificial teeth who would work with any certainty, and whose operations are to approach any thing like scientific accuracy. Experiment may indeed reveal these things, but there is a vast difference in economy of time between experiments instituted at random by a man ignorant of chemistry, and those designed by one having a competent acquaintance with that science.

These are facts which I presume no unprejudiced man who knows any thing about the requirements of dentistry will presume to deny. Those who persevere, therefore, in their sneers at chemistry as connected with dentistry, seem to me to be acting very much like those old farmers who talked so much against book agriculture. They had some weight at first, on account of their reputation as practical men, but very soon it was found that book farmers might also be practical, and that they possessed besides an advantage over and above their practical skill, which enabled them to apply it without loss, viz. a scientific knowledge of the principles upon which their art was based.

What has been the result? The mere practical farmer has been crowded out; he has become obsolete, a sort of monument of old fogyism, while scientific agriculture is rising every day higher and higher. So it will be, I venture to predict, with the so called practical dentists who are setting their faces against

the introduction of chemical science. The advancement of the art will leave them hopelessly in the rear.

Persevere, then, I pray you, in the course you have laid out for yourself. Though you may encounter opposition at first, you must ultimately triumph, for your cause is a good one.

S******.

New York, October 16th, 1853.

ARTICLE VI.

Hot Air Blow-pipe. By CHRISTOPHER JOHNSTON, M. D., &c.

IT is hardly necessary to adduce arguments in favor of the *hot blast*, or its superiority over the *cold blast*, in the reduction of metals. But while the principle was acknowledged, its application was restricted to the grosser operations of manufacturers, and the experimental chemist, the analytical mineralogist combined to employ the ordinary blow-pipe in spite of its positive defects. To obviate the latter, I contrived a very simple instrument, had it constructed by Delevil, of Paris, and sent it in 1851, to my friend Dr. David Stewart.

The practical utility of the hot air blow-pipe has been established by that gentleman, and also by the Baltimore Academy of Arts and Sciences, before which I had the honor of exhibiting it.

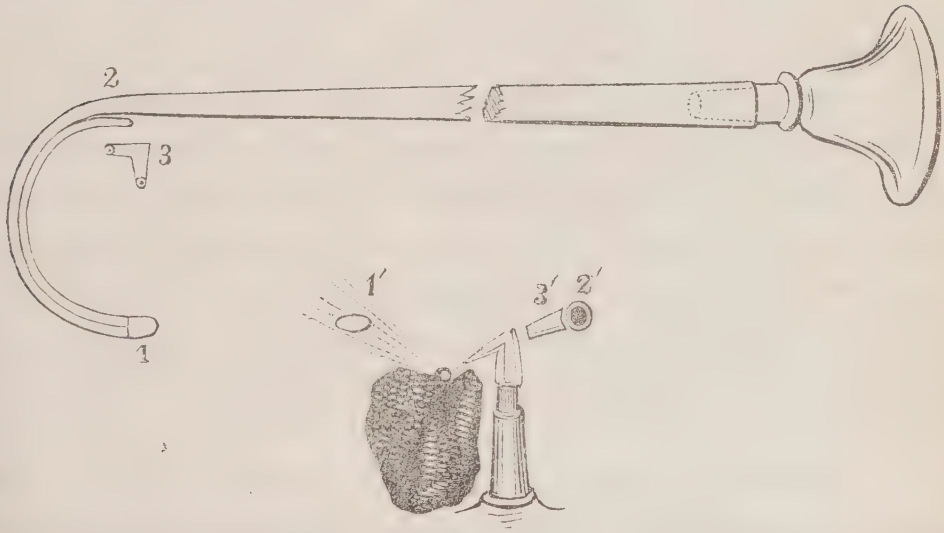
The instrument consists of a tube of convenient length, tapering from the proximal to the distal end, and bent upon itself at the remote extremity so as to form a horse-shoe, of which the plane makes a small angle with the body tube, so that the middle of the curve shall not rest upon the charcoal used to support the object submitted to examination. The end of the tube now lies upon or against the body—upon it is fitted by friction a point bent at a right angle, and its proper direction may be attained by rotating the point upon the end of the tube.

An ivory mouth-piece is adapted by friction to the instrument, which gilding by the galvanic process, renders both cleaner and neater.

Employment.—The point (3) is adjusted in such manner that the *flame* impinging upon the metallic particle shall be reflected upon the knuckle or ferule (1) which becomes intensely heated, as does the AIR which passes through it. Moisture cannot interfere with the process, because upon reaching the heated ferule it is converted into surcharged steam, which, at the issuing point, escapes *above* the flame.

It is obvious that the knuckle or ferule cannot be melted, inasmuch as it loses caloric by radiation, and yields it to the air and the steam in process of *surcharging* within.

If the *point* be widely rotated upon its axis (longitudinal) the instrument may be used as a common blow-pipe.



1. Ferule—1′. Same seen in front—3. Movable point—3′. Same depressed so that the *flame*, when directed upon the object shall in great part be reflected upon 1′. 2′. Section of stem at 2.

ARTICLE VII.

The Essential Oil of Tobacco, a German Remedy for Tooth-Ache, with the mode of preparing it and the three cases which deterred the writer from ever attempting to administer it again. By J. L. LEVISON, D. D. S.

HAVING read some papers in your excellent periodical, on the effects of tobacco on the teeth, et cetera, it occurred to me that the following might be acceptable. Not so much for any scientific value of the communication, but as indicating the absurdity of any empirical treatment, particularly when the remedial agent is a powerful poison. Tobacco is known to be a most dangerous narcotic and stimulant, and when used without due care, death has often resulted, from even an infusion of the weed when injected *per ano;* but how much more potent and dangerous it is in its immediate effects on the brain and nervous system in general, and on the nerves of the stomach in particular, when administered in the form of the essential oil of this plant, in ordinary tooth-ache. The stomach being in such case immediately affected through the mucous surfaces, and the brain afterwards.

Prior to giving my own experience, it is essential to state my method of preparing the essential oil. I procured a clay-pipe, filled it with tobacco, and on the extremity of the tube a mouth-piece was put, cut from the lower part of a goose-quill, and into this tube or mouth-piece I inserted a portion of white cotton wool. The tobacco was then ignited, and a few streams of smoke were drawn through the cotton into the mouth, and from the latter sent in graceful curls into the circumambient air. A few seconds sufficed to saturate the cotton with a dark yellowish oil.

Case 1.—The writer's sister had a very carious tooth, but from a sense of fear would not have it extracted. As she suffered excruciating pain, which none of the usual palliatives re-

lieved, she was persuaded to try the oil of tobacco, and it was prepared after the above method.

The cotton thus saturated with essential oil, was inserted in the hollow tooth, and in an instant the pain ceased, but the after consequences were indeed most frightful. The young lady was entirely prostrated, and was subsequently sick, and purged for nearly three days, like in the autumnal English cholera. In fact she was poisoned. But her consolation for this temporary inconvenience and punishment, was regarded by her as less annoying than her previous neuralgic suffering. Yet she would not have recourse to it again.

Case 2.—Being on a visit to a Unitarian minister, an habitual smoker, he said whilst we were walking together in his garden, "my dear sir, I wish you could cure the tooth-ache of Susan our cook, as she is suffering extreme agony; and has lost so many teeth, that she is reluctant to part with the few which remain." I answered, that I would try if he would furnish me with a pipe and the other materials required. When all was ready, Susan was summoned to appear in the paved court-yard before the house, which, with the garden, was enclosed by a high wall. It was a beautiful summer morning, and she came most willingly. After explaining the action of the remedy, I administered it, cautioning her to reject the cotton wool speedily, and on no account to swallow the saliva. The patent cotton was then put into the tooth, and she immediately lost all the pain. I then left her to resume my *tete a tete* with her learned master, but turned round to ascertain if Susan had gone to resume her vocation in the *cuisine*, when to my horror I saw her gyrating in such a rapid manner, like one in a state of extreme intoxication, that I ran back with the speed of a grey-hound, and just came in time to save her from falling, which would have been attended with some permanent consequence, as she was a very fat woman. So all the *fee* I earned, consisted in using my utmost effort to assist the servants to convey a senseless piece of humanity to her bed-room, where I labored for some time to restore her to consciousness. When this was effected, she was quite free from pain.

Case 3.—My last case was likely to be attended with some personal danger. A very tall and powerful farmer came into a shop in which I was at giving some orders, when he said, "I am mad with the tooth-ache." The shopman, who knew me, answered, "well this gentleman can cure you." "Ah!" sighed the yeoman, "but not without taking out the tooth, and I had my jaw nearly broken when a doctor tried it some time since." I proposed the German remedy, and retired into a back room to prepare it. There my stalwart patient came on being summoned. The cure was instantaneous, and I could have exclaimed with Cæsar, "*veni, vidi, vici.*" For with a regular halloo, he shouted, "the pain's gone! the pain's gone." And as I did this, *sans* a fee, I left immediately afterwards. Particularly as the robust young gentleman seemed quite well. Soon afterwards he was taken very sick and dizzy, was conveyed to the inn, and had to go to bed. When he recovered he sought for me every where, and threatened "to give me a sound drubbing;" so as this sort of practice was profitless, I have abandoned it ever since.

Yet with some greater precaution, the dental practitioner might have recourse to this remedy in bad cases, whenever the patient had a dread of extraction.

If I ever ventured to use it again, I would have an alkaline lotion, and after inserting the patent anti-neuralgic remedy, would give some of it to rinse the mouth, as the alkali would combine with the oil and form soap, and then probably the unpleasant effects might be prevented, which had hitherto been the result of its application. When my health is better, I hope to send you a paper more intrinsically valuable in a professional point of view, and you will, therefore, exercise your editorial sagacity whether you insert it or reject this one, and although you may take "the will for the deed," if you decide the latter verdict, all I ask of your courtesy is to give this "Roman honors," or in other words, a fiery ordeal.

14 *Devonshire Place, Brighton, Nov.* 15, 1853.

ARTICLE VIII.

Note for the Essay, "On the Mortality of Children during the First Dentition," in the Journal of Dental Science, for April, 1853. By J. L. Levison, D. D. S.

In the paper, published in your valuable Journal on this subject in April, 1853, we traced disturbance during the formative process of the teeth, which especially involved the vascular, the nervous and the mucous systems, and we then promised to add a few remarks on the effects produced on the *dermoid* tissues.

Every practitioner is familiar with teeth-rash, as it is popularly called,* which rises in small vesicular pustules, isolated, or in patches, and is one of nature's modes of modifying the otherwise greater consequences of dental irritation. The pathology of all forms of *dermoid* affections during the primary dentition, will be found to result from two causes, viz. nervous disturbance, and mucous irritation.

That the brain and the skin may be sympathetically affected, is obvious by the fact, that often when cutaneous affections are suppressed, insanity will be manifested; or when the latter sad affliction exists, it is greatly relieved, and not unfrequently cured by modern physicians, by producing, artificially, extensive cuticular pustules.

Skin diseases, therefore, during dentition, may be regarded as an effort of nature to induce counter-irritation. And when it is remembered that the mucous surfaces (or inner skin) are particularly implicated during the progress of the first dentition, and that there exists a great sympathy between the mucous tissues and the cuticle, we have a rationale of the final cause of

* *Tinea mucosa* (milk scall) is often induced during teething. It differs from *tinea annularis*, true ring-worm, as the latter may be the result of uncleanliness, or inoculation; whilst the first may co-exist with dental irritation *per se*, even with the greatest care and with the most rigid cleanliness.

the effort to counteract the tendency to acute diarrhea by extensive skin-affections, which otherwise might terminate fatally. So then it is essential during the first dentition, for the practitioner to mark the various seats of irritation, and to prevent any extreme disturbance of the *vascular* and *nervous* systems, or the *mucous* and *dermoid* tissues, by a free use of the lancet, and, so to speak, go to the source; and by removing the cause of irritation, avoid the many unpleasant and often fatal consequences which result, if these preventive measures are neglected.

ARTICLE IX.

Introductory Lecture on Practical Anatomy for the Dentist. Delivered before the Class of the Baltimore College Dental Surgery—Session 1853-4. By W. R. HANDY M. D.

GENTLEMEN—Allow us to congratulate you on the present occasion—the occasion of entering upon a month's preparatory practical study. Your presence bespeaks your appreciation of this month's practical training, and we could only wish that more—yes, we might add all, would avail themselves of the practical advantages it offers.

We say this month is set apart as a preparatory month to the regular course of lectures—a month designed especially for practical study—a month in which you are to practice the different senses, to educate the *eye* and the *hand* particularly—a month, in which you are to gather together *facts* for future use, to lay a *foundation* upon which the after superstructure of your professional edifice is to be reared—a foundation, which to remain unshaken, must rest upon *science*. Yes, we repeat it, upon *science*, as the only legitimate basis, the only sure and trustworthy rock on which to build and practice the art of dentistry. All other foundations, we insist, are of sand, and will not stand the light of truth and investigation.

Every other art acknowledges science as its only *true* and proper basis. Why, we ask, should not the art of dentistry? There is, and can be no reason assigned why it should not. All the lovers and practitioners of this art, we mean those who sincerely desire its *elevation*, its *dignity* and *progression*, practice to this end. We say all such as these are practicing upon *science* as their foundation—are laboring hard, and making great sacrifices. Yes, we may safely say, not a few of such are at this day making great personal self-sacrifices, to lay still deeper, and wider, and stronger, and more enduring, the *foundations of dental science.* They acknowledge no other basis, either morally or pecuniarily, upon which as honest men, they can rest the hope of seeing their profession a respectable and useful one, and at the same time obtain and enjoy a conscientious, comfortable and satisfactory living.

Whilst on the other hand, all the rest who practice the dental art, (we refer to the self-styled dentists,) do not and will not care any thing about *science*—whose *name* is *legion*, and who practice every species of charlatanism under the guise of dental surgery, upon their unsuspecting and credulous patients, and with no other principle than that of making money, sacrificing every thing like *moral honesty*, *decency* and *knowledge*, and holding up as their only title to confidence, the recommendations of *ignorance*, *arrogance* and *boasting skill.*

This latter class, it is affirmed, have no *foundation of science* upon which to rest their loud pretensions, (and consequently no claim upon the community,) for either trust-worthy skill, or legitimate professional honesty.

Science, says one lexicographer, is "certainly grounded on demonstration"—says another, it is "art attained by precepts, or built on principles."

Art, then, it is perceived by these definitions, is *demonstrative science*, not demonstrative in the loose acceptation of the term, but demonstration "*grounded*" upon real and positive certainties—*grounded* upon *real*, *substantial* truths—upon *unerring principles* applied to art, and found to stand the actual test of practice.

An art, thus founded upon the certainty of demonstrative science, and resting upon the unalterable principles of truth, is a *safe*, *useful* and *ennobling art*. And every art not so founded, we may as confidently affirm, is not safe, not useful, not ennobling, but, on the contrary, hap-hazard in its skill, highly injurious in the vast majority of cases, and positively destructive in a great many others.

Dental art, gentlemen, which you have chosen for your profession, does not form an exception, but like all the rest, must also be based upon the firm foundations of science—which is called dental science. Your art must also be studied, as industriously studied, by all the lights of said science, as any other art. And still further, by this same science each of you must expect to practice, habitually practice, the dental art, if you would wish to have it, as it always should be, a safe, useful, ennobling and respectable art.

What, it may here be asked, is dental science? What are its foundations? What its limits? What its requirements, necessary to be fulfilled before one is competent to undertake and practice the dental art?

We reply that *medical science*, *chemical science*, and *mechanical science* constitute the *fundamental* and *essential elements* of *dental science*. These are the *foundations* necessary to be laid, before you can expect to practice dentistry safely, successfully and conscientiously.

Practical Anatomy, is one of the branches of medical science, and thus forms part of one of the foundations stated as necessary to dental science. And as it is this portion which belongs most especially to our department, and of which it becomes us the more properly to speak, we shall, therefore, confine our remarks very briefly to this one point, leaving the rest of the fundamental elements of dental science to be explained by the appropriate chairs for this purpose.

What, then, are we to understand by *practical anatomy* for the dentist? It is hardly necessary to reply, gentlemen, that we mean the *anatomy of the knife—the anatomy of real, actual dissection—anatomy* requiring the diligent and persevering use of

the *eye* and the *hand*, and not confined to book anatomy, and the anatomy of the plates, acquired by memory. Such anatomy as these latter furnish, is not practical anatomy—is not the kind of anatomy which will help you in time of need, when you each shall engage in practice. The anatomy of the books and plates are very necessary and useful, but only so far as helps in the actual dissection of the body itself, in showing you how to display its several parts, and never designed to supersede the knife. But some may be ready to ask, as it has been asked, what has *dissection of the human body* to do with the practice of dentistry, or at most any further than the mouth is concerned? The answer to this question, involves the most we have to say in reference to practical anatomy. And in reply, the *first remark* we have to offer is, that *dentistry* cannot be a *science* without the *aid* of *practical anatomy.*

This position requires very little proof, if the definitions already given of science, be received as conclusive. For if medical science has, as universally admitted, practical anatomy for its basis, and if dentistry is only a branch of medicine, then it necessarily follows that practical anatomy is, also, the basis of dental science. We, therefore, pass on to our *second remark*, which is a necessary and inevitable consequence of the first, viz. that dentistry, *as an art*, cannot be practiced properly, that is in accordance with science, without the aid of practical anatomy.

If this position, gentlemen, be true, it is all important that you should know it; and know it, not only as a common, vague and general truth, but know it experimentally, as a *great practical principle*, to be tested by each of you individually, if you expect to attain the professional standing of scientific dentists. As this is a point of much practical interest to each of you, it may be necessary to offer here a brief explanation.

How then is dissection to aid you in the practice of dentistry? If such a question were seriously put to a student of medicine or surgery, it would occasion the greatest surprise; even the slightest intimation that dissections could be dispensed with, would be regarded as showing either great stupidity or ignorance. Now why should there be this difference of feeling between the

student of medicine and surgery, and the student of dentistry? We feel safe in replying there is and can be no reason for the difference, for the same line of argument that establishes the necessity of dissections in the first case, applies with equal force to the second.

To show that such is the fact, our proposed explanation on this head, will be best given by running a brief contrast between the two cases just mentioned, viz. of the student of medicine on the one hand, and the student of dentistry on the other.

The student of medicine and surgery urges that the practice of his profession deals exclusively with the human body, with all the organs composing this body collectively, as well as each individual organ, considered separately, and that to attempt to restore such a body when injured as a whole, or in any of its parts, without an acquaintance from previous dissections, would be equally if not more absurd and presumptuous than for an individual to attempt the repair and regulation of a watch, about which he knows nothing.

It is further urged, and very justly, that it is not only necessary to know that there are organs composing the human body, but further, and what is more important, that it is absolutely necessary to know where these organs are, what is their natural location, what their healthy form, size, color, consistency, structure and relations.

Now it is contended, that all such knowledge as this can only be obtained by means of *actual*, *individual* dissections, such dissections as require that each student for himself, shall lay hold of the knife, and faithfully and perseveringly use it, in the exploration of the wonderful mechanism of man's organization; in other words, that there can be no *proxy* in the matter, but on the contrary that the *eye* and the *hand* of each must be thoroughly drilled, and educated, to see and know for himself; for every deviation from the natural, healthy, physiological condition of an organ, whether that deviation be in the location, form, size, color, consistency or structure, constitutes in the same proportion disease, and this disease or deviation being only cognizable by the eye and the hand, must, of necessity, have these senses practically exercised to be able to detect it.

It is true, the books and plates will accurately tell us where organs are, what their form, color and all the physical characteristics belonging to each; but this is not practical knowledge, the knowlcdge which is to avail you when you are brought to the bedside of disease, or have to operate. Your knowledge then to be applicable and trust-worthy, must be such as you each do know, and have tested for yourselves. What, suppose you, would be thought of that surgeon who would attempt to tie the carotid or femoral artery, or perform the operation of hernia, without ever having seen or handled the parts involved? Why the most liberal judgment, in view of such utter recklessness of human life, could not pronounce such surgeon any thing less than a madman. Or what would be thought of that physician who could talk learnedly from the books, of congestion, hepatization, dropsy, tubercles, pleurisy and other affection of the chest, who would boast, at the same time, of his superior skill in their treatment, and yet have never seen the lungs, the windpipe or the pleura? Or what would be thought of either surgeon or physician, who would mistake ague and fever and give bark and quinine, when such ague simply depended on the sympathetic relation between the urethra and spinal marrow, produced by the introduction of the catheter? And so the same remarks apply to each and all the organs of the body, showing that dissections are indispensable to properly qualify one for practice.

Now how is the case with the student of dentistry? Has he not to deal with the human body and its different organs, as well as the medical and surgical student? Does he not also have to inquire into disease and its cause? Can he escape, without deserved censure, the equal necessity of tracing the relations of the several organs? If an affirmative reply be given, the necessity of dissections must be admitted.

It may be replied, however, that the dentist has not to do with the whole body—that his duties are strictly confined to the teeth and its diseases, and that he is travelling out of his sphere when he goes beyond that. But diseases of the teeth, especially their sympathetic diseases, depend, for their cause, on disease in some one or more remote organ or organs. As a

skillful dentist and a master-workman in your art, would you be justified at the bar of conscience and before your patients, in pleading as an excuse for sacrificing their teeth, that the cause of the mischief was in some other organ and not in the teeth, as you had suspected; that you were sorry for the mistake, but as you had nothing to do with any other part of the body but the teeth, of course there was no blame to attach to you in the matter?

Would any of you gentlemen, for one moment, attempt to offer such an apology? No! We would venture the assertion, there is not a man, who is not profoundly ignorant or knavish, that would not be ashamed (and so ashamed as not even dare) to offer such an excuse in the presence of deceived and suffering humanity.

Your art embraces the duties of both physician and surgeon, and your science claims for its basis the firm foundations of both medical and surgical science.

The teeth, you all know, are organs—that as other organs they have blood-vessels and nerves—that by these latter they are connected with the rest of the system, as other organs—that this relationship is as strong for weal or woe (in proportion of the teeth's vitality) as that of any other part of the body, and that, as the rest of the organs, they also grow, attain maturity, become diseased, decay and die. In a word, health, disease, decay and death, attaches to the teeth equally with all other organs, and in the management of their diseases require an equal amount of skill and knowledge.

We will briefly enumerate a few of the more prominent diseases of other organs arising from diseases of the teeth, and disease of the teeth from disease in other, and often distant organs, each alternately becoming *cause and effect*, so as to impress upon your minds the *natural* and *inseparable relation of the teeth* with *each* and all the *organs* composing the system, and still further to impress the other fact, that so close is this relation that it is impossible to practice successfully in either without a knowledge of both.

Convulsions, *photophobia*, *otitis*, *hydrocephalus* and *dys-*

pepsia, constitute a few of the affections arising from disease of the teeth. Convulsions occur during dentition. The fifth pair of nerves are the great sentient nerves of the dental apparatus, and its superior and inferior maxillary branches, especially, supply the teeth. It is by these latter branches that the painful impression of dentition is carried to the brain, and through the brain, by means of the motor nerves, acting on the voluntary muscles, it is, that this frightful muscular disturbance, called convulsions, is produced. Photophobia is a dread of light, as its name implies, and consists of excessive, and the most painful sensibility to the impressions of light. The first branch of opthalmic division of this same fifth pair of nerves goes to the eye, and readily explains the medium of production of this terrible affection, when the teeth are the cause.

The American Journal of Medical Science records a most interesting case of this disease, where, after every kind of treatment had been tried, nothing but the extraction of a few teeth did any good; and this, the record informs us, most promptly and effectually cured the affection, showing most conclusively that the teeth were in fault, and that they were the cause of all the mischief. This case teaches a most useful lesson to physicians, who are so prone to overlook or even to suspect the teeth as being the sources of mischief beyond the limits of the mouth.

Otitis, hydrocephalus and dyspepsia, when originating from disease of the teeth, may be explained to be produced through the medium of the fifth, associating with the eighth and sympathetic nerves.

Disease of the antrum or maxillary sinus, whether it be inflammation, suppuration or tumor in this cavity, does not require any special explanation as to the manner of origin, for the antrum and teeth being close together—so close, indeed, that the latter are not unfrequently found to penetrate the former—readily accounts for disease of the one passing into that of the other, solely, as physiologists express it, by the sympathy of contiguity.

If we now turn to the second class, we here find in the stomach, salivary glands, uterus, extremities and organs of circula-

tion, examples of disease of other organs acting upon and producing disease in the teeth. When the stomach is surcharged with acidity, and the salivary glands have their fluids vitiated, the teeth are liable to decomposition from the action of these altered agents. Disease of the uterus, especially during pregnancy, may cause the most violent pain in the teeth, and injuries of the feet have often locked the jaws with that most formidable disease, termed trismus or locked-jaw, a spasmodic affection so violent that the teeth cannot be separated, so as to open the mouth, without resort to great force. These are all sympathetic diseases of the teeth that are dependent upon, and have their origin in some one organ or organs more or less remote. They bear, in their symptoms, all the semblance of reality; so much so, indeed, as sometimes to baffle the most scientific in their detection. These sympathetic diseases, however, of the teeth, should, and must be detected, if you wish to save yourselves the mortification of extracting sound ones, and of incurring the censure of ignorance and a want of skill in the practice of your profession.

But, gentlemen, we respectfully ask, how are you to escape such censure if you scarcely know anything of the existence of such organs—nothing at all of their locality—and still less of the relations of these organs with the teeth, upon which relations depend the sympathetic diseases of the latter? The *cause* of these sympathetic disorders of the teeth you would never be led to suspect of being in some other part of the system, if you confine your attention solely to the teeth, and look no further. And if, with all the light of science, and the most persevering and thorough *dissections* of the whole body, the greatest skill has been baffled, how can those expect to succeed who totally neglect dissections, or so far deny their utility as to think that the smallest quantity possible will suffice for all practical purposes.

This latter class are willing to concede, that it would be as well, perhaps, to dissect the mouth—not, however, with any high and ennobling motives for the discovery of facts and principles by which to attain to a more skillful and successful practice. Not at all; but, on the contrary, from the operation of that

lower and baser motive—that it would not look genteel in fashionable society—not to know anything about the mouth; and still further, if something was not known, at least in a general way about it, so that a *quantum sufficit* of learned nonsense should be at hand for all occasions, why nothing would be gained by it.

This remark, gentlemen, may appear as if bordering too much upon an extreme, amounting, it may be thought, to an unjustifiable caricature of the matter. Allow us to reply, that if you do not know it now, you will hereafter, very soon, find it to be sober, undoubted reality. For how many, we may ask, of those self-constituted dentists, who only pretend to an acquaintance with the mouth, and who ignore a knowledge of all the other parts of the body as totally useless. How many, we ask, of such as these, can even tell you where the *palatine artery* is, of which, there is a constant liability to injury in the daily operation of lancing the gums? Or how many of them know where the *superior constrictor of the pharynx* is situated, a muscle, which is so near the posterior teeth of the lower jaw, as to readily incur the risk of being divided, and the consequence of which injury would be the inevitable crippling of the function of deglutition, as well as serious impairment in the use of the voice?

The answer would, most undoubtedly be, that few, if any of such dentists were aware, or even suspected that such dangers were constantly in their path, and ever present in all their daily operations on the mouth; and yet they will lay claim to a knowledge of the mouth, proving most conclusively that they have not even a book-knowledge, much less a practical knowledge from *dissections*.

In *conclusion*, gentlemen, we trust enough has been said to show that the *art of dentistry* is based upon *principles—scientific principles*—resting upon the *firm foundations* of demonstrative truth, and as a part of which truth, *practical anatomy*—the anatomy of dissections—forms an *essential* and *indispensable element* in enabling you to conscientiously and successfully practice this art.

REVIEW DEPARTMENT.

ARTICLE X.

Principles of Organic and Physiological Chemistry. By Carl Löwig, Doctor of Medicine and Philosophy, ordinary Professor of Chemistry in the University of Zurich, &c. Translated by Daniel Breed, M. D., of the U. S. Patent Office, &c. Philadelphia, A. Hart, late Carey & Hart, 1853.

The work before us is a laudable, laborious and learned attempt to introduce something like order and system into that great chaos of facts which we call organic chemistry. If there be any domain of science from which the student shrinks appalled, at the magnitude of the field and the multitude of the facts which throng it, it is this. A thousand acute and untiring observers have for these many years been laboring here. Every root, every flower, every leaf in the vegetable kingdom, every secretion, every tissue of the animal world has been scrutinized, peered into by microscopes and polariscopes, tortured with all imaginable acids, alkalies and salts, charged with galvanism, subjected to all temperatures. From these manipulations have arisen a host of new compounds.

Isis refuses to have her veil lifted, Proteus flows away under a thousand shapes. But vain are all his disguises, his pertinacious pursuers have more powerful incantations than the ancient shepherds that caught him on the shore. Every new guise he assumes is carefully copied and elaborately studied.

To all these hosts of new compounds, modern science has given names as repulsive to the novice as Almyzinthra, the Green Dragon, and the other mystic titles of the old quackish fathers of chemistry. Alchemy itself can boast of few more

embarrassing and unintelligible words than *mercaptan*, *benzidam* *trinitranisol*, *kapnomur*, or a thousand others which modern chemistry has introduced. To add to the confusion resulting from such barbarous words, they have hitherto been scattered pretty much at random through our chemical works. The feeblest possible tie is sufficient to hold them in juxtaposition; the merest accident has served as a basis of classification.

Dr. Löwig has taken up this unpromising subject. He has attempted to coerce this anarchical mob into regular battalions, and to classify them behind their appropriate banners. Like all first classifiers he has probably laid himself open to the charge of too great artificiality in his arrangement. But surely an artificial classification is better than none at all. It is an aid to the memory. It exhibits to us some points of resemblance among these numerous isolated individuals. It enables them to group themselves so that we can glance along the ranks and rectify defects afterwards. If Linnæus had not made his artificial system, it may be doubted whether we should at this day so greatly reverence Jussieu and Cuvier.

Löwig regards this book as an introduction to his larger work, the Chemistry of Organic Combinations. This will account for the absence of certain facts. Thus, he neither states the name of the discoverer of an organic compound, nor does he give the per centage of its components, but confines himself wholly to the expression of chemical composition by formulæ.

Certain organic bases have always been admitted. Thus, acetic acid $C_4\ H_3\ O_3$ has for some time been written in this manner: $(C_4\ H_3)\ O_3$, $C_4\ H_3$ being taken as the organic basis acetyl. This is no hypothesis but an actual truth susceptible of demonstration, for if chlorine, bromine or any other element be made to decompose acetic acid, we find that each element enters as three atoms which take the place of the three atoms of oxygen, giving as such compounds as $(C_4\ H_3)\ Cl_3$, $(C_4\ H_3)\ Br_3$, &c. This may be regarded as a matter already established.

But this has left the science of chemistry encumbered with a confused rabble of bases without order, proportion or symmetry, a great mob of *proximate elements*, (to use a very common but

very questionable phrase.) It, therefore, remained an open question, how the elements in these radicals were themselves combined. It was to this department of inquiry that Löwig directed his attention. He found that a very simple law of increase regulated the formation of these radicals, that groups of them differed from each other, in fact, only by a + or — C_2 H_2. Thus, if from ethyl, C_4 H_5, C_2 H_2 be withdrawn, we have methyl, C_2 H_3; and, if from acetyl, C_4 H_5, C_2 H_2 be subtracted, we get formyl, C_2 H. Certain other radicals, as benzid, are found to have the same ascending C_2 H_2, but with the addition to each member of C_8, which is regarded as the nucleus of the compound radical.

These preliminary observations being made, it is easily to understand this system of classification, which possesses the advantages of facility of acquisition, clearness and comprehensiveness, so that the relations of these radicals can be retained without unnecessarily burdening the memory.

The *first* and simplest class of radicals, Löwig calls *carbyls.* They consist each of several atoms of carbon, which form the entire base. Thus oxalic acid, C_2 O_3, is assumed to be the teroxyd of a radical consisting of two atoms of carbon (C_2 = oxotyl.)

The *second* division comprises those which contain, in addition to the carbon, certain atoms of hydrogen. Acetyl, C_4 H_3, is an example.

The *third* class embraces the *azocarbyls*, which consist of nitrogen and carbon, as *paraban*, N_2 C_6.

The *fourth* class includes the *hydroazocarbyls*, or radicals, consisting of nitrogen, hydrogen and carbon. Uren, N C_2 H, is an example.

The ammonias are classified separately as *hydryls.*

These, with their *derived* and *paired* radicals, constitute the great majority of the organic bases with which we have to do. By the doctrine of pairing, he explains very clearly, many of those remarkable instances of isomerism which have given chemists so much trouble.

The best illustration of our author's method of dealing with

the abstruse inquiries he has undertaken, is to be found in his analysis of his group of *hydrocarbyls*. We have already shown how from ethyl, by the abstraction of $C_2 H_2$, methyl arises ($C_2 H_3$.) If we further subtract this from methyl we get a single atom of hydrogen. We may therefore write out these radicals thus:

$$\textit{Methyl}, = C_2 \; H_3 \; = \; C_2 \; H_2, H.$$
$$\textit{Ethyl}, = C_4 \; H_5 \; = 2 \; C_2 \; H_2, H.$$
$$\textit{Amyl}, = C_{10} \; H_{11} = 5 \; C_2 \; H_2, H.$$

Thus we see that these radicals can be divided into two parts, the $C_2 H_2$ or its multiple and the constant nucleus H.

An examination of formyl, acetyl, &c., will lead to a similar result. We have already shown how formyl is obtained by abstracting $C_2 H_2$ from acetyl, and here the subtraction stops, for we have reached C_2 H, which does not contain $C_2 H_2$. If we therefore proceed to construct a series, as before, we get the following:

$$\text{Formyl}, \qquad C_2 \; H.$$
$$\text{Acetyl}, \quad (C_4 \; H_3) = \quad (C_2 \; H_2) + C_2 \; H.$$
$$\text{Propionyl}, \quad (C_6 \; H_5) = 2 \; (C_2 \; H_2) + C_2 \; H.$$
$$\text{Butyryl}, \quad (C_8 \; H_7) = 3 \; (C_2 \; H_2) + C_2 \; H, \text{ \&c.}$$

An analysis, therefore, of these two groups, gives us the same $C_2 H_2$, or its multiple, in both, with an additional element, which differs in the two series. The group of radicals possessing a positive character, have H added to the $C_2 H_2$, while those which are negative have C_2 H. These, therefore, H and C_2 H, constitute the *active element* or *molecule*, and the $C_2 H_2$, multiplied by various numbers, the *ascending passive component.*

There is still another series of radicals belonging to the class of hydrocarbyls, differing from both the former. Thus, if from camphyl $C_{10} H_7$ we substract 2 ($C_2 H_2$) we get terecryl $C_6 H_3$. If to the same we add 13 ($C_2 H_2$) = $C_{26} H_{26}$, we get oleyl, $C_{36} H_{33}$, the radical of oleic acid. By a careful examination of the structure of these compounds, we learn that we have here an ascending series similar to that of the formyl group, with this difference, that an additional C_2, which is called a nu-

22*

cleus, is introduced into each member. We get, therefore, the following series:

$$\begin{array}{llcl} \text{Terecryl,} & C_6\ H_3 & = & (C_2\ H_2)\ C_2\ (C_2\ H.) \\ \text{Camphyl,} & C_{10}\ H_7 & = & 3\ (C_2\ H_2)\ C_2\ (C_2\ H.) \\ \text{Moringyl,} & C_{30}\ H_{27} & = & 13\ (C_2\ H_2)\ C_2\ (C_2\ H.) \\ \text{Oleyl,} & C_{36}\ H_{33} & = & 16\ (C_2\ H_2)\ C_2\ (C_2\ H,)\ \&c. \end{array}$$

It will be seen that these two series differ from one another in the proportion which the atoms of carbon sustain to those of hydrogen in these two classes of hydrocarbyls. In the one class, which is made up of the formyl and methyl groups, we find that the atoms of carbon differ from those of hydrogen by only one. In the other, there are several atoms of carbon more than of hydrogen in each member. Hence, a division of the *hydrocarbyls* into *hydrisocarbyls*, or those in which the hydrogen and carbon are combined in nearly equal proportions, and *hydropolycarbyls*, or those in which the atoms of carbon considerably exceed those of hydrogen.

From these are derived several other groups, as the *elayl* and *acetonyl groups*, arising from a pairing of the radicals of the formyl and methyl groups, the *succyl* group, a pairing of the oleyl and formyl groups, &c.

By this classification we can distribute a very large number of radicals under appropriate heads. There still, however, remains a great number of animal and vegetable compounds of higher organization, as well as certain products of decomposition, which are not to be ranged in any of these classes. These are treated of under appropriate heads, corresponding to the old distribution of these same compounds.

Whatever may be the ultimate fate of this system, it cannot be denied that, as it is the first, so it is a very successful attempt to give a clear idea of the relations of these numerous compounds. The chemist will find this book altogether indispensable, and will look forward with anxiety for the appearance of the more extended survey of organic chemistry, which has so masterly an introduction. P.

SELECTED ARTICLES.

ARTICLE XI.

A Few Thoughts on Dental Practice. By T. W. Evans, D. D. S., of Paris.

[The following paper, which treats on several important topics to the profession, was designed by its author, Dr. T. W. Evans, to be read before the American Society of Dental Surgeons, at their last meeting, but as he did not arrive until after the meeting adjourned, it has been furnished to us for publication.]—*Ed. Dental News Letter.*

Gentlemen—I have assumed the responsibility of addressing you upon the present occasion, not only for the pupose of contributing my mite to the general stock of information and experience, but also with a view of uniting myself more closely with an institution which has done so much for the advancement of dental science.

I here find myself surrounded by eminent men, all animated by an enthusiastic love of their profession, and attached to each other by that "unity of spirit" which is the "bond of peace;" whose names have been familiar to me almost from childhood, the memory of whom has stimulated me, both at home and abroad, to exertions which else may have been impossible. It has been my ambition to be worthy their esteem and friendship. I knew the reputation they enjoyed, not only in our own country, but in distant lands, and I resolved, when leaving home, to establish myself in what is considered to be the metropolis of medical and surgical science, to do what I could to sustain that reputation. The aim was as worthy as the task was arduous. I entered upon my mission with diffidence, but with courage, and

was resolved that, so far as it was dependent upon diligent study and patient labor, it should be accomplished.

I now return to visit my native land, after six years of experience, which it would be false modesty in me to deny, have been crowned with unhoped for success. Whether that success has been deserved is not for me to decide. But this much I can certainly say, that it has not been gained by any artificial or factitious means, but has grown naturally and steadily, though rapidly, without any effort on my part except to merit it.

I have entered into no special competition with the members of our profession, more or less worthy and eminent, by whom I have been surrounded, but have always sought and succeeded in sustaining the most friendly relations with them: though I confess to have had enough of the spirit of rivalry to be resolved that neither our noble science, nor our natural reputation, should suffer at my hands.

Our reliance for success must always be upon those who have intelligence enough to appreciate, and liberality enough to reward our labors; and it is encouraging to know that, thanks to the rapid march of civilization, with which our science keeps steady pace, this class of society is ever on the increase.

Especially in this our own happy country, where the elements of not only polite learning, but of profound science are taught, even in our common schools, it may reasonably be hoped that every truly deserving profession will, ere long, be almost universally recognized.

For my own part, I have no complaint to make even in Paris, for although, as charlatanism seems to be quite as prevalent there, at the very head-quarters of science, as in less favored cities, it has offered no serious barrier to my success. Justice to my immediate "connection" requires me to say, that I have met with the most intelligent appreciation and the most liberal encouragement. The class of men who are caught by flaming advertisements, and who think a dentist has no name unless they have read it at the corners of the streets and seen it side by side with Brandreth's and Day & Martin's in newspapers, kindly pass me by on the other side. They rush to my neigh-

bor whose liveried bill-collector struts about the city with his master's name and profession inscribed upon his back in letters of appropriate brass; or, perhaps, they patronize the "celebrated dentist" who has wheeled himself into their affection with his chariot and span of white horses!

Doubtless, gentlemen, your experience and observation have been the same. The patrons of fancy dentists, like the patrons of natural bone-setters and universal panaceas, interfere little, if any, with scientific practice. To quarrel with them is absurd. "They are joined to their idols; let them alone." As for putting down imposition, you might as well talk of putting down human nature. Mankind are used to be taken in, and they *like it.* Hudibras, who

> Know *what's what*, and that's as high
> As metaphysic wit can fly—

has taught us that

> The pleasure is as great
> In being cheated as to cheat.

Horace Mann wittily describes certain country school-houses in New England, as being very useful to the world in showing how school-houses ought *not* to be built, and it strikes me there are certain dentists in the world—in the New World as well as the Old—who do good service in showing how dentistry ought not to be practiced. It is our privilege to show the contrary; to oppose sham by science; to dispel darkness with light. And, I repeat it, it is to those who seek after the light, and who follow step by step the onward march of science, to whom we must look—and to whom, believe me, no one of us will look in vain for countenance, encouragement and support.

There may be exceptions, but I doubt, as a rule, if a diligent, pains-taking, enlightened dentist can be found, on either side the Atlantic, who can reasonably complain of want of success. He may be encompassed with difficulties; peculiar circumstances may make his path more difficult than yours—than mine; but if he has sufficient courage, and energy to oppose them, they will all be eventually removed, though to-day they lay piled across his track like mountains.

I will not dwell upon the obvious importance—the absolute necessity of labor; hard, unremitting, self-sacrificing labor in order to secure success; for on this subject we have all had line upon line, and precept upon precept; but I am sure you will pardon me if I insist that we must not only work diligently, but that we must work well.

In this country, where every man is in a hurry, where the road from the cradle to the grave is one vast race-course, and where labor is more respected and better rewarded than in any other country on the face of the globe, indolence is not so much to be guarded against as negligence.

Most men work hard enough, but few men work well enough. It is an old saying, and one that has peculiar force in our profession, that "whatever is worth doing is worth doing well." Nothing can be slighted with impunity, from the making of a pivot to the delicate adjustment of a spring. Whether our workmanship is to be exposed to the eye, or concealed from sight, it ought to be done with an artistic nicety of finish. The filling of a tooth, for example, once thought by many to be so simple and trifling a matter, requires as much care as the setting of precious stones.

I mention this only as one instance, but it is one peculiarly significant to me, because it was in performing this operation that I first became aware of the importance of doing the operative, or rather the artificial part of our work, with the utmost fidelity. I had the good fortune to learn this lesson at the outset of my career, and the first testimonial I received in my profession, though much less brilliant and costly than many I have since received, I value more than all the rest—more even than those coming from royal hands—because it was a public recognition from my own countrymen, from my own colleagues even, not of the many things which I had done indifferently, but of the one thing I was supposed to have done well, and that one thing, gentlemen, was the filling of teeth, and I cannot tell you with what pride I have since learned that, in consequence of this tribute to acknowledged merit, some of my young contemporaries have been stimulated to apply the same degree of labor

and care to other branches which I had devoted to this one branch of our art.

I have thought it not amiss, gentlemen, in these fast, labor-saving times, to dwell with some emphasis on the essential importance of executing the minutest details of our work with the greatest care and skill; and if I have ventured to illustrate my idea by a passing allusion to my own experience, it is not for the purpose of making an invidious comparison between myself and others; but, on the contrary, to show if I had met with any peculiar success it has resulted not from any talent peculiar to myself, but from a capacity common to us all: viz. the *capacity of hard and faithful labor.*

In addition to the more obvious reasons for neglecting no detail of our workmanship, I may mention that by rigidly following this course, (I speak again from my own experience,) the humblest of us may hope to arrive at some discovery or improvement for the advancement of the profession.

Dr. J. H. Foster, in his excellent opening address before this society, at its annual meeting in 1851, remarked: "Those who are attaining pre-eminent rank and reputation in our profession, are those who are performing new and untried operations."

Now, who of us does not know that these "new and untried operations" are often suggested by the faithful performance of those which are old and familiar.

The new idea comes to us, as it were, like a spark from an anvil in the heat of our work, and seems to endow us for the moment with a new sense. We work on with renewed zeal; the vague idea gradually assumes form and distinctness; until at last we are enabled to present our science with a new discovery, baptized with the sweat of our brow, if not christened by the world with our name.

I have been experimenting in my humble way, and "performing new and untried operations" from the beginning; knowing well that *where nothing is* ATTEMPTED *nothing is* ATTAINED.

When I was told, years ago, (to recur to my favorite experience,) that there were certain teeth so decayed, and their cavities so large, that to fill, and thus to save them, was next to

impossible, I was all the more determined to persevere; and after applying myself diligently to the work for many long and weary months, my efforts were at last crowned with success, and rewarded with approval. Animated by this early and triumphant achievement, (for I confess to have been proud of it,) I was ambitious to excel in other departments of our art, and was even presumptuous enough to covet a wider and more difficult sphere for my labors.

Indeed, it had been the dream of my youth to go abroad; so, gathering up the few laurels I had earned—scarcely enough to make a chaplet—and calling into exercise all my courage, I crossed the ocean, and established myself boldly in the heart of the Old World.

There, as here, my determination was an entire devotion of myself to my calling. I own to having had at first some little misgivings—as any one might well have on finding himself for the first time amidst all the splendor and glory of the most brilliant capital in Europe—but yet something within me—it was probably a little of the old American leaven—made me feel that I should succeed. This, however, is not very striking, for somehow or other there appears to be something in the heart of every American which tells him pretty much the same thing.

But I am indulging too much in personal reminiscences. To go back a little: Believing with Dr. Foster in the importance of "new and untried operations," and feeling that our own science, like every other, was yet to be enriched by many discoveries, I was anxious to have my share in their discovery and application.

It was at this period, gentlemen, that some of the most respectable members of our profession were seeking to find out some method whereby, in certain exceptional cases, teeth might be filled with less labor for the operator and less annoyance to the patient than the ordinary method of filling with gold.

I was not without hope, myself, that some such discovery would be made; not that I was at all desirous to shrink from any necessary amount of labor; but I *was* anxious that a large class of persons, whose nervous constitutions can poorly stand

the fatigue of a prolonged operation, should, so far as was safe and practicable, be spared the torment of undergoing them. I saw at once, it was true, that most of our fillings must continue to be done in the old way; but I had hoped that certain peculiar cases might be treated with equal success in some less fatiguing and more expeditious manner. And, at one moment, as some of you, gentlemen, are aware, I fancied that I myself had done something towards the proposed discovery; and, over anxious, perhaps, to extend its benefits, I was too easily induced to proclaim it to the world, and associate it with my name. I did not do this without numerous and apparently successful experiments; and the experience of other and eminent men seemed to show that I had conferred upon our science an important benefit. But the final result proved me to have been in error; and I had no honorable recourse but to publish *this fact* as widely, as a short time previous I had published my supposed discovery. I promptly and frankly adopted this course, and have never *repented it.—Dent. News Letter.*

[To be continued.]

ARTICLE XII.

Mechanical Dentistry. By Prof. T. L. Buckingham, M. D., Dentist.

Our profession is divided into two grand divisions, viz. The operations on the natural teeth, and the manipulations required to replace these organs when they have been lost.

The first is termed operative dental surgery, and includes all the operations usually performed upon the natural teeth. Filling, plugging, scaling, extracting, the treatment of the diseases of the mouth, and the treatment of the irregularities of children's teeth, are all included in this branch.

To the mechanical division belong all the manipulations required to make artificial substitutes, and the apparatus necessary to correct the irregularities of natural teeth.

In the first division, nearly all of our eminent dentists are engaged, and they find sufficient to occupy all their time, without leaving them any to devote to the mechanical branch. It is, therefore, mostly performed by the younger members of the profession, or by others who have not been able to obtain a sufficient amount of operating to employ all their time. I allude now to the mechanical manipulation required to make artificial substitutes. I know that nearly every dentist has more or less artificial work done, but there are very few, except those alluded to above, who do it with their own hands.

There was a time when the workshop was indispensable to a dentist; his occupation was then considered a mechanical art, and practiced as such. His views are now changed; dentistry is no longer an art, but a profession, requiring for its operations only, a scientific knowledge of the natural teeth and their surrounding parts. I have heard many freely admit their ignorance of the mechanical branch, and almost boast that they knew nothing about it; others, although they allow that skill may be required in its operation, contend that it is but a mechanical skill, and term those who practice it, dental jewellers, or workers in *china-ware* and *pottery*.

Many now advocate the entire separation of these two branches, under the impression that both might be benefited thereby.

I propose now to examine the possibility of a separation. I admit that if they were entirely separated, it would be a decided benefit to the mechanical branch. But can they be separated? In large cities, where there is a large practice, the two branches may have offices connected, with a decided advantage to both. But where there is but a small practice, or in small towns, or in the country, I think it is impossible to separate them. No operator, in the present state of our knowledge, can be so successful as to save all the teeth that comes under his care.

There are cases presented, were so many of the teeth are

diseased, and some of them so far gone, that it is necessary to sacrifice them to enable us to save the rest. These may be saved, with proper treatment and care, for a long time in a comparatively healthy condition, if nothing interferes with their natural functions. But if an artificial tooth is improperly placed by their side, or a clasp put around them, they are irretrievably lost.

Would a dentist who has a proper care for his patients, be willing to trust them in the hands of one who is admitted to be inferior to him in knowledge, skill and judgment? But we are answered, he may take the impressions, and have the work done for him. How far he can do this, and give satisfaction to his patients, we will examine in a subsequent part of this article. Our object is now to examine the possibility of a separation of the two branches. We are directed to look, as an example, at medicine, which is being divided into physic, surgery, obstetrics, &c., and with a decided advantage to each division; but this can only be done in large cities. There is, perhaps, not one surgeon practicing in the United States to every hundred physicians, and there is not one in fifty of these that practice surgery exclusively.

Even in our large cities, nearly every physician practices more or less minor surgery, and in small towns, and in the country, they are absolutely compelled to perform nearly all the surgical operations. But allowing that the dentist can send his patients to one whose ability and skill he has perfect confidence, does he by these means get rid of all the mechanical manipulations? Is he not required to be a thorough mechanic to perform his every day operations in his office? (omitting the operation of filling teeth, which, in itself, requires a great deal of mechanical skill.) The dentist has, in correcting irregularities of children's teeth, to apply every principle of mechanics he can bring to bear; the lever, fulcrum, screw, wedge, inclined plane, all have to be applied, and with all these means, and all his skill, he has sometimes the greatest difficulty to overcome the obstacles that are presented. I know of no occupation that calls so much upon the mechanical ingenuity of the operator as

dentistry. He has often to shape his instruments while his patient waits in the chair, or make or alter an apparatus before he can send him away. Nearly every case presents some new obstacle, which he has to overcome by his ingenuity, requiring him not only to invent, but to construct such means as will accomplish the object desired.

In small towns, and country places, the dentist must necessarily practice both branches. In repairing, if nothing else, he cannot get his patients to wait until he sends his work away to be done. What would they think of a dentist who would ask them to wait three or four days, while he sent the case away to have a tooth or a clasp soldered on, which should take only about half an hour to do it. We are compelled to do these repairs while the patient waits in the parlor, and we pity the dentist who is not able to do them himself. We have known dentists to leave their patients sitting in their chairs while they walked a mile to have a case repaired, when it would not take half as long to repair it, as it did to walk the distance.

We might relate cases to show the importance of a dentist being able to do his own work, but it is not necessary. We all can imagine the mortification that must be felt by a person who has been wearing a set of artificial teeth, when they are compelled to go into company without them. Ladies generally shut themselves up in their rooms, and deny all company; and gentlemen, when they are compelled to attend to their business, do it with the greatest reluctance. One remarked to us the other day that he would almost as leave be seen without his nose as without his teeth.

Admitting that there is a mechanical dentist near at hand, to whom the operator can send his patients to have artificial work done, is it policy for him to do so? Patients, generally, have not the ability to discriminate between the capacity of one who is capable of making a piece of mechanism to be used in the mouth, and one who does what they consider a mechanical operation in it. We have known dentists whose practice has been built up or materially benefited by operators recommending patients to them, to have artificial work done.

Let us examine, and see whether a dentist can do justice to his patients by merely taking the impressions, and having the work made for him. Our object, when we insert artificial teeth, should be to imitate the lost organs as nearly as possible, or at least to make such substitutes as will suit the case. If we will examine all the sets of natural teeth that come under our notice, we will find that no two are exactly alike, and yet many of them are very handsome, far beyond any artificial substitute we can expect to make; and what generally constitutes their beauty, is the harmony with which they agree with the other features of the face.

Teeth which would be handsome in one mouth would be decidedly ugly in another; a person with a full, round face, may have short, thick teeth, worn off half way to the gum, and yet they may give a better expression to the mouth than other shaped teeth would. Another tall, thin person, has long, narrow teeth, the upper row lapping the under very much. These are just the teeth to give a pleasing expression to his face. Between these two extremes we have every variety; some with jaws so narrow and contracted, that their four natural incisors scarcely occupy space enough for two; others, with mouths so large that we can hardly find teeth wide enough to fill the space.

Again, we have patients of all ages, requiring artificial teeth; some of sixteen, others of sixty years of age. Natural teeth show the effect of time and wear upon them as much as any of the other organs of the body. Even in animals, whose teeth are formed much more regularly and uniformly than the human teeth. They are a criterion by which we judge their age, and we can tell, after they have been extracted from the jaw, whether they belong to the old or young animal.

I think I have shown—if it was necessary to show what every body knows—that all sets of natural teeth are not alike. I might now proceed to show that all sets of artificial teeth are made as much alike as the cases will permit.

To be sure, they are in some cases made a little larger than they are in others, (but this is only because the jaws are larger,) and there is, perhaps, two or three shades of color.

With these exceptions, they are made as near alike as the mechanical dentist can make them. In fact, he forms in his mind, or makes himself a model of the most perfect shaped teeth he can conceive of. This he makes his model to go by in all cases. It makes no difference whether the teeth are for an old person or a young one, they are all made alike.

This must necessarily be the case, when the person who makes the teeth has never seen the patient. How can he form them to suit features that he has never seen? If we were to send to an artist who makes artificial limbs, and request him to make a leg or an arm to supply one that had been lost, and send him nothing to go by but the impression of the stump and the length it was to be, would any body suppose that he could make one that would correspond with the natural limb? or, if a person should require an artificial nose, and was merely to send the impression of the surface it was to cover, could any body expect that it would correspond with the other features of the face?

These are as explicit directions as are generally sent to have artificial teeth made. A piece of wax, adjusted upon a plate that fits the jaw, and a tooth the color they are to be, is all the direction usually considered necessary. Then should we be surprised that we find artificial teeth all made alike; or when we find a stout, athletic man, whose features show that he has been exposed to all kinds of weather and has followed some laborious occupation all his life, having the same shape and style of artificial teeth that are placed in a delicate lady's mouth?

Even where the dentist has the laboratory in the house with his office, and has an assistant to do the work, his presence is almost constantly required if he wishes to give satisfaction to his patients, and many of the manipulations he must positively perform with his own hands. He cannot convey the idea of the expression of the patient's face by the most explicit descriptions he can give, and without this it is impossible to arrange teeth to harmonize.

Let us point out some of the manipulations required to insert artificial teeth, and we will see how much can be delegated to

another. After the impression has been taken and the plaster cast made, it is necessary (when there are teeth on it) to trim it more or less. It is impossible to get a perfect impression of natural teeth with any substance we now use. Teeth are larger at their crowns than they are at their necks, and generally their points approximate where teeth between them have been lost. This will cause the wax to be dragged up, so that the impression will be imperfect, and the cast require trimming, which should be done by one who has seen the mouth. The metal casts can now be made, a plate struck up, and the clasps adjusted, by an assistant. They should now be tried in the mouth, each part separately, and adjusted to fit the parts properly.

They should then be cemented together and tried in the mouth, and arranged so as to fit without forcing or dragging the natural teeth in any direction—all this requires the presence of the operator. The different parts of the apparatus can now be soldered together by any person capable of doing it.

The teeth are now to be selected and arranged. This is the most important part of the whole operation. This cannot be delegated to another, but must be performed by the dentist himself, if he wishes to give satisfaction to his patients. When the teeth have been tried in the mouth and arranged to suit, the case may be finished by any person competent to do it.

If we now divide the time required to perform these manipulations as we have separated them, we will find that the dentist will have to be engaged at least twice as long as his assistant; in fact, there is little of the whole operation that can be delegated to another.

If we have succeeded in showing that there should be some harmony between the teeth and the other organs of the face, we think we have demonstrated fully the necessity of the person who takes the impression and puts the case in the mouth, doing at least two-thirds of the work with his own hands.

We have said nothing in this article about the utility of artificial teeth, or the benefits the wearer may derive from them beyond their mere appearance. Their importance in mastication, and the effect they have upon the voice, may form a subject for another article—*Dental News Letter.*

ARTICLE XIII.

Death from the Administration of Chloroform——Autopsy. Under the care of Mr. PAGET, of St. Bartholomew's Hospital, London.

THE following are the particulars of the case of death from chloroform, to which we alluded last week. In reference to the administration of the agent, we may state, that at St. Bartholomew's it is, by appointment, always confided to the very able charge of Dr. Black, one of the assistant physicians.

On Thursday afternoon, Oct. 20, it was intended to apply the actual cautery to a sore of cancroid nature in the vagina of a patient named Ann Smith, aged 22 years. She was a stout, florid young woman, formerly of dissolute habits, but apparently, with the exception of the local ailment, in perfect health; she had been in the hospital several months, and, about a fortnight previously, had been put under the full and prolonged influence of chloroform for a like purpose, and without the occurrence of any untoward symptoms whatever. Her pulse was regular, of good power, and average frequency. It had been ordered that she should omit her dinner on the day of the operation, but, as discovered at the *post-mortem*, she had, unknown to the nurses, taken a quantity of food, though not a full meal.

The usual form of inhaler was employed,—a padded metal cup, fitting over the nose and mouth, and supplied with valves. A drachm, by measure, was first poured on the sponge, but, as the administration did not immediately commence, a considerable part of this was no doubt wasted; after a short inhalation, a second drachm was supplied, and subsequently the further quantity of half a drachm. The patient had gone through the usual stages of excitement, etc., and the last dose was scarcely used, as she sank off, almost immediately after its application, into a state of complete insensibility, unattended by any alarming

symptoms. About five minutes had been occupied in the inhalation, and probably not more than a drachm and a half of the fluid really inhaled. The apparatus was now removed from the face, and the patient having been drawn into the proper position, Mr. Paget was about to commence the operation, when Dr. Black, who throughout had kept his finger on the pulse, noticed it to have become extremely feeble and fluttering. Almost immediately afterwards the patient's countenance was observed to be dusky, turgid, and congested, and the respiratory movements began to be performed at long intervals, and by slight catching efforts. No time was lost; cold water was at once dashed on the thighs, face, and breast, and, the failure in the respiration becoming shortly complete, Mr. Paget immediately began artificial insufflation of the lungs by alternately blowing into the nostrils, and compressing the chest. Just before commencing this process, Mr. Paget had ascertained, by drawing the tongue forward and examining the glottis with the finger, that the epiglottis was not pressed down. Artificial respiration through the natural passages having been very efficiently kept up for about ten minutes, the nose appeared to have got clogged, and Mr. Paget accordingly performed tracheotomy in order to permit of the more free introduction of air into the lungs. A brandy enema was administered, and, within ten minutes of the seizure, galvanism was also put in use, but without any good result, and after about three-quarters of an hour had been spent in persevering efforts to produce reanimation, they were laid aside as hopeless. It was noticed, that immediately after the first alarming symptoms, the pupils were of medium size, neither contracted nor dilated. All efforts at respiration ceased about two minutes after the first indications of failure; the pulse, however, as a very feeble flutter, was felt occasionally for at least two minutes later. Thus, then, the facts of the case were briefly these: A patient, in profound coma, from the administration of an anæsthetic, had, the exhibition of the drug having been remitted, been suddenly seized with symptoms of failing circulation, followed by the speedy suspension of respiratory efforts; the pulse had remained perceptible

a little time after the cessation of the latter, and had been lost, together with every manifestation of vitality, within five minutes of the first indication of danger. Every effort to re-excite the play of the organs essential to life had been fruitless. In the turgidity and suffusion of the countenance there had been some indication of death by asphyxia. The preceding coma, and the fact that the failure of the pulse had been the first symptom exciting attention, each pointed to other conclusions. The brain, the heart, the lungs,—in which organ had death commenced? This seemed the important problem. Let us now see what evidence the *post-mortem* examination furnished for its solution.

Autopsy performed by Mr. Paget twenty-two hours after Death.—The countenance was still bloated and suffused; the *post-mortem* rigidity was moderate in degree, or rather less than usual; there was much congestion and lividity of the skin of the depending parts of the body; the corpse was very fat. The thorax was first examined, and nothing whatever abnormal could be detected in any of its viscera; the lungs were healthy and crepitant in every part; their posterior lobes were not more congested than is seen in almost every examination; the heart collapsed, but not contracted, and containing a small quantity of fluid blood in each cavity, was of normal size and proportions in every respect, and its muscular structure examined by the microscope showed no degeneration. Excepting that the exterior of the right kidney was puckered in places, as if from disease in early life, nothing worthy of note was observed in the abdominal viscera. The brain, its sinuses, ventricles, etc., were all carefully examined, and neither in texture nor quantity of blood was anything abnormal detected. The spine was not examined. In every part inspected—the heart, great vessels, lungs, vessels within the abdomen, those of the scalp, pia-mater, and brain—the blood was universally fluid, and without the slightest trace of coagulum, or even of inspissation. Collected in the quantity of an ounce or two, and allowed to stand in an open vessel, it did not coagulate, nor in any material degree change its dark purple color. Looking,

then, at these facts, and comparing them with the symptoms manifest during life, we seem compelled to seek, in a humoral pathology, the cause of the patient's death. There was no visceral disease, functional or otherwise. In all probability the blood, poisoned past recovery by the vapor it had received, had died, and ceasing then to afford to any of the organs their natural stimulus, the whole of the vital functions had ceased almost coincidently.

This case, in common with most of those which occur in our Metropolitan hospitals, has one most especially melancholy aspect—a matter, as far as our knowledge goes, of pure accident—it teaches us nothing for the future. We need not recapitulate to convince the attentive reader that the patient was one to whom chloroform might, with the least of apprehension, be administered; she was in good health; she had taken it safely before. Then, again, in the manner of exhibition, every precaution was adopted, and, in the after-treatment, all that science could suggest was perseveringly tried. In our large hospitals the requisite skill, assistance, and appliances are always at hand; and there, if anywhere, an immunity from fatal results might be expected. It is mournful, indeed, to consider that from cases such as the last three or four, which it has been our lot to record, the practical surgeon gains no knowledge calculated to authorize the hope, that in future, the like tragedies will be of less frequent occurrence.—*London Medical Times and Gazette.*

ARTICLE XIV.

Death from Chloroform. By John Roberton, Manchester.

Sir:—In common, I am sure, with many of your readers, I was shocked at the report, in your last number, of the death

of a healthy young man under chloroform in the Edinburgh Infirmary. The impression is the more painful from what your reporter states, namely, that "a great error in the administration of chloroform prevails in that hospital;" that in hospital practice its administration is commonly entrusted to some raw dresser, who, thinking he cannot give enough of a good thing, squeezes a towel saturated with it over the mouth, where it is kept firmly applied, so that the admixture of chloroform with atmospheric air is rendered impossible.

Having been much in the habit of employing chloroform during the last five years, always with advantage, and without the occurrence of a single symptom to excite anxiety, it may not be unbecoming in me to make a few remarks on its administration.

Chloroform is a powerful agent, just as opium is a powerful agent. If improperly given, it will cause death; not, perhaps, with the same certainty as opium, for some constitutions resist its injurious influence in a wonderful manner; but still, as experience shows, it *may* produce death, which is all the more appalling from the suddenness, and from the impossibility, in nearly every case after the heart ceases to beat, of effecting resuscitation.

Now, in giving opium in the lying-in chamber in the form of laudanum, or Battley's sedative liquor, to allay false pains, or to soothe after an exhausting delivery, I am in the habit, as I suppose others are, of giving a certain number of drops, or of measuring, with care, a certain quantity. I don't think of giving the bottle to a nurse or other attendant, to pour out at random a dose for the patient to swallow. Were I to do so, I should hardly fail to have some ill effects. No one in his senses would administer, in this way, a preparation of opium.

Now, is not the remark equally applicable to the inhalation of chloroform? When administered in proper quantity, and there is a due admixture of atmospheric air, the effect is benign; but, when given in the *ad libitum* manner of some, what wonder if death or alarming consequences follow?

I will relate a case, on purpose to show the mode in which I

am accustomed to give chloroform, as also the rash manner in which it is sometimes employed by others.

On entering the chamber of a lady in labor, a few months ago, I found her provided with a bottle of Edinburgh chloroform. Her former labors having been hard, and the children of large size, she had determined, on this occasion, to have chloroform. When the stage for its employment arrived, I placed one end of a smooth napkin (so folded as to be about 7 inches in breadth by 10 in length) between her cheek and the pillow, she reclining on her side; and, requesting the husband's presence, I desired him to pour out a quantity not exceeding the fourth of a teaspoonful, which I sprinkled on the napkin opposite the patient's mouth and nose, at the same time bringing the other end over her face, yet not so as to approach it closely or to cover it; consequently, the air had free admission: three or four proportions of air to one of chloroform at least were inhaled. The sprinkling of a like quantity was repeated, about every three minutes, four times, when the patient was found to be asleep; and in a similar manner she was put to sleep five times in the course of three hours, at the end of which period labor terminated.

I have detailed this simple case for the following reason: I had noticed, at the outset, that the husband and the nurse smiled at the minute quantity I was administering; and, when sleep followed, I observed a marked expression of wonder, as if something quite unexpected had occurred. The explanation was this: The nurse had seen chloroform used once only before, and in large quantities, and she had been, I suppose, predicting that the lady's two-ounce bottle would be found too little, because, as she informed me, in the case referred to, the accoucheur had, from time to time, saturated a handkerchief with chloroform, and, during the labor, consumed nearly half a pint. The patient, she said, struggled and raved violently during its use, and yet without bad effects ensuing.

I have myself known chloroform administered in labor in dessert-spoonfuls until the pulse was at 40. Recently, too, I have known it, after being used cautiously for a short while

with benign effect, given in the quantity of two drachms preparatory to the application of the forceps; and such were the alarming effects, that the patient turned herself suddenly on her back, and lay, with oustretched arms, for a few moments, pulseless.

Of course I do not mean that a drachm is not a safe, in many cases a proper, quantity, provided it be mixed with a reasonable proportion of atmospheric air, and is not repeated until the first quantity has been exhausted. But I do assert, that a larger quantity is dangerous, and I take the liberty emphatically to repeat, that it is as blameable in any surgeon to trifle with chloroform, by allowing it to be administered in random quantities by young and inexperienced hands, as it would be to trifle after the same manner (which, however, no surgeon does) with the preparations of opium.—*Medical Times and Gazette.*

ARTICLE XV.

Diseases of the Surrounding Tissues Originating in Carious Teeth. By C. BATE SPENCE, Esq., 8 Mulgrave Place, Plymouth, England.

I HAVE said, that one of the greatest evils which can result from an irregularity of the teeth is the predisposition which they have to be affected by caries on the surfaces which approximate each other, not that their pressing one against the other inflicts any injury on the structure of the dentinal tissues, but that their close approximation offers convenient positions for the perpetual lodgment of the juices of the mouth, which, although not injurious in themselves, yet, being the vehicle which holds in solution the elements which chemically carry away the salts of the teeth, those parts of the teeth must be much more liable to be acted upon which are so placed as to be mostly

under their influence; in other words, those spots where saliva always rests.

Nor will the evil stay itself in the loss of the teeth; caries of the tooth produces exposure of the pulp to many abnormal influences, under which disease and pain are produced. This terminates sometimes in the forcible extraction of the tooth affected, sometimes in more serious ills, which latter I have generally found to be the more important where the tooth has been destroyed under the ravages of caries, without inducing inflammatory action of the pulp, and, consequently, without producing pain, which circumstance, perhaps, may in itself be a leading, though indirect, cause of the collateral malady, an example of which may be seen in the following case of Mrs. T. A. M., a married lady of somewhat about forty-five years of age, the mother of a family, all of them healthy.

It was while extracting a tooth at the house of one of my patients, that the lady to whom this present case refers requested me to observe a swelling of which she had been conscious for some little while to exist at the side of her nose beneath the left eye. It was not very large, but painless, and exceedingly hard. Upon examining the state of the internal mouth, my attention was drawn by herself to a decayed upper first molar upon the same side. It had never pained, was firmly fixed, and showed no symptoms of alveolar disturbance; the remainder of the teeth upon that side were generally sound and healthy; and I thought myself justified in confirming her notion in attributing the possibility of the tumor to have originated from this source, even though it existed at some distance from the irritating cause.

Having taken this view of the case, on which diagnosis an advantage existed in being on the safe side, since the treatment which should follow could only affect a diseased and almost useless organ, the removal of the decayed tooth I suggested as being advisable, which gained a ready assent, with the request, that I should operate immediately—a circumstance for which I was not prepared, the forceps which I had with me being for other teeth; and we parted with the understanding that she was to call at my house on the succeeding day.

Instead of fulfilling her portion of the arrangement, a whole year was allowed to pass away before I again saw her, when she sent for me to call upon her, which I did at her own house. Upon seeing her I could scarcely suppress an expression of astonishment at the alteration and great disfigurement which the countenance had undergone. The swelling had enlarged considerably, pressing the nose aside, drawing the corner of the mouth awry, and giving a disagreeable distortion to the whole countenance. A wide separation had also taken place between the left centre and lateral incisors.

The history of the case for the last twelve months was, that in consequence of my not operating immediately, and requesting her to call upon me to have the tooth extracted the next day, induced in her mind the idea that I must have thought the tooth difficult to extract, and, therefore, created a fear as to the result which she had not previously entertained, but, which having once been aroused, she sought the advice of her usual medical attendant as to the propriety of her losing this carious but painless tooth.

From some inexplicable cause, he advised her by no means to part with it, since there was no evidence to show that the tumor situated in the anterior region of the face was caused by a tooth, though carious, yet situated among the most posterior in the mouth. But twelve months had passed away, and there was no occasion now for any persuasion in order to win her consent to the removal of the molar, to which allusion has already been made as being decayed. I also took advantage of my present influence to induce her to have removed from her mouth every particle of substance which might, under unfavorable circumstances, become sources of irritation to the surrounding soft tissues; for instance, a few fangs of decayed teeth upon the opposite side of the mouth, together with not a little quantity of salivary calculus.

About a week after this period, the tumor, which had previously always been very hard and free from pain, became soft, tender, and even painful, after the manipulation necessary to diagnose its character.

A few days after, it appeared under the finger to fluctuate as if it were filled with some fluid, and showed a disposition to become inflamed upon the external surface, indicating what appeared to me signs of approaching suppuration.

Hailing this as a most fortunate index of the result which might be expected, and wishing to preclude the liability of its burrowing through the cheek, and forming an ugly scar upon the face, I inserted a lancet into the tumor, between the upper lip and the gum; but, instead of a copious flow of pus, as I had hoped, a small quantity only escaped, together with a watery fluid, which latter continued to flow through the opening for some time, the orifice made by the lancet being kept open. Shortly after this, the tumor became painful, although it decreased in size and became soft.

I have previously observed, that a separation had taken place between the lateral and central incisors upon the same side of the mouth. The former of these two teeth, together with the adjoining canine, seemed to yield from their place, as if their original strength of position had become weakened. This not being continued to the central incisors, seemed to point to the separation which was taking place between the lateral and central as being the line of demarcation between the diseased and healthy tissues. The bone posterior to the central incisor was evidently separating from the rest of the bony structure by necrosis. I felt that the proper mode of treatment would be to remove these two otherwise sound teeth, to which a ready consent was given. But although I felt convinced of the correctness of my own opinion, yet the part which I take in the adjustment of artificial teeth induced me to request that a second opinion might be taken, in order to convince herself and family that she would not unnecessarily lose teeth which in themselves were not diseased.

It was some time after this before I saw her again, and which was only in consequence of an express request, when I was alarmed to observe, that the whole system felt the shock to such an extent that health was seriously yielding under it.

I was then requested to carry out my own treatment, in re-

moving the teeth, which I had previously proposed, and do whatever I thought proper; but since my opinion had not been supported by the advice called in during the respite of my visits, I declined to operate, when they said that they should seek assistance in some other neighborhood; this, in consequence of her fast declining strength, I urged upon them to carry out immediately, and which was obtained from the skillful hands of the younger Mr. Travers, who, through the assistance of Professor Bell, instantly removed the teeth in question, a few portions of the alveolar ridge came off by necrosis, after which the tumor disappeared, the opening in the mouth healed up, and the general health rapidly and successfully progressed; but the system was a long time before it quite recovered, even if it ever has completely, from the shock given to it by this local irritation, originating in a decayed but painless tooth.

ARTICLE XVI.

Destruction of the Hard Palate, Originating in a Carious Tooth. By C. BATE SPENCE, Mulgrave Place, Plymouth, England.

SOME pages back, I had occasion to allude to a case wherein the palate had been destroyed through an abscess, attributed to the abnormal pressure caused by the development of the third molar tooth.

I now wish to draw attention to a somewhat similar case, which was brought under my notice by a lady who consulted me respecting a small hole in the roof her mouth. This originated in a similar swelling to the last, on the palate, but succeeding severe pain from a carious tooth. The latest which I have heard of this lady, who resides in a distant county, is, that the

disease has assumed a somewhat chronic form, a slight discharge still continuing to pass through the hole into the mouth.

The osseous roof of the mouth was eaten through, but the membranes lining the floor of the nose had not been perforated to any great extent; consequently, no passage existed between the two facial orifices which might affect speech or deglutition.

This is by far the most important, as to the results, which I have seen of the kind, originating in a diseased tooth; but I have frequently met with cases which must have terminated in exfoliation of the palatal bones but for a timely rescue.

When the membranes existing upon the fangs of the teeth, and those covering the walls of the alveoli, become affected by the pressure of a decayed tooth, it generally develops an abscess. The pus which it originates endeavors to escape, so as to pass out of the system; this it does sometimes through the pulp cavity of the tooth, sometimes between the tooth and the walls of the alveolus; sometimes it works its way out through the external alveolar wall, developing a small abscess or boil upon the surface of the gum. But, should it do neither of these, as may result, particularly if the palatal fang of the upper molars, which sometimes spread out at a large angle with the others, the disease becomes so deep-seated that it is not able to find its way out, and therefore eats through the internal wall of the alveolus, and burrows beneath the palatal integuments, which, in order to fulfil the duties of the mouth, is more than usually tough, and therefore becomes a source of obstruction to the free exit of the pus. The result is, that a tumor, increasing towards the base, is formed; it is generally painless; and, when opened, the bone beneath will almost invariably be found denuded of its periosteum.

Of course, in the treatment of such cases, the first and most important step will be, to remove the irritating tooth—most generally a decayed one—though I have seen it result from a tooth worn by mastication. But, as far as my experience goes, it arises from a tooth planted firmly in the jaw; I much question if it could result from one that was loose, since then the

pent-up matter would find its way between the walls of the alveolus and the tooth.

If it should be found that the extraction of the tooth admits of a free passage for the discharge of the pus, there may possibly be no occasion for laying open the tumor; but, if the discharge is still confined, and the operator is certain that pus is formed, the swelling should be freely opened, but with caution, since there is more than one case on record of tumors of similar appearance, upon being lanced, having shown themselves to be traversed by blood-vessels so important, that serious bleeding has been the result, sometimes to the great risk of the patient's life.

Of course, the more systematic treatment courtesy would hand over to the physician; it would probably consist of the iodide of potassium, together with a course of tonics.

These cases, which, from their position, must be looked upon as important, are far from uncommon; and, although their growth in general may be very slow, yet their history, as sometimes detailed to me, has extended over but a few days duration. One of these last I have but lately seen; the tumor was as large as a pullet's egg, and originated from the stump of a decayed left upper lateral, which was removed after some difficulty; the tumor was opened and pus escaped; the bone was found to be denuded of its periosteum to the extent of the surface of a crown-piece. An astringent lotion to the part and aperient medicine were ordered, since which I have not seen the individual, who is engaged in the copper-works in this locality; and I am informed by others, that he pursues his avocation, and they believe him to be restored.

But the following is a case of more interest to the dentist, inasmuch as it is one wherein the application of artificial teeth was required:

It is about five years since I was sent for by Mrs. J., a widow lady, about 50 years of age, who wished me to make for her an almost entire piece of artificial teeth. Upon examining the mouth previous to taking the model of her gums, I observed a rather extensive swelling of the surface of the palate, chiefly

upon the right side of the mesial line, and in front of the mouth existed the fangs of from six to eight teeth.

She told me that she had been conscious of this swelling for about seven or eight years, dating it from a severe tooth-ache which she had in the right lateral incisor, and which had been broken in an attempt made to extract it by her own medical attendant.

The swelling had given her no cause for uneasiness, as it never pained. Occasionally, it increased in size, but always soon again decreased; and this circumstance she attributed to the pressure arising from artificial teeth she had been in the habit of wearing for some time, and which, she informed me, were well adapted and otherwise comfortable.

Fearing that pressure, particularly of new work, might excite this tumor, I strongly pointed out the very great desirableness of having all the stumps removed, especially that to which she attributed the origin of the mischief, but without obtaining her consent; therefore the piece was adjusted under existing circumstances, and which she wore for about four years without any injury to the tumor; and it was not until last summer, when, having caught a severe cold, she had much pain in all the stumps, attended with considerable swelling of the gums, that I could obtain her consent to the removal of all the affected teeth, which was done under the partial influence of chloroform. The gums healed, absorption progressed in a healthy manner, and the tumor disappeared. Somewhere about two months was allowed to elapse before fresh models were taken. A fortnight after this, my patient drew my attention to the increase of the old tumor of the palate; this was before any artificial work was applied to the mouth, and therefore could not have originated from undue pressure on the part; but, in truth, it was so very slight, that I imagined that it could never wholly have disappeared, though she strove to assure me to the contrary. I therefore, when the false piece was completed, felt no disinclination to yield to her desire to have them in the mouth. But the swelling, not at all improbably excited by the plate, continued rapidly to increase, until in a few days it rose

to such an extent, that I begged her to throw aside her teeth, and place herself under the skillful and experienced hands of my friend Dr. Bird, who laid the tumor open, and found it, he informed me, gorged with blood, there being no escape of matter. Upon the healing of the incisions, the tumor greatly decreased, but had not disappeared when I saw her last, somewhere about a month previous to writing this. Of course, she has not yet been permitted to wear the artificial work.

The remarkable point in this case is, that it should have remained for a period of about twelve years *in statu quo*, neither advancing nor retrograding until the exciting cause (the decayed teeth) was removed,—that it should first wholly disappear, and shortly return with accelerated virulence.

Diseases like these, although fortunately not of every day occurrence, yet are of sufficient frequency to urge upon all the great advantage of preserving the teeth in a healthy condition, or of having them restored as early as possible when they have been attacked by disease; or where this has progressed so far as to render them useless, they should be treated as extraneous bodies, and be forcibly removed, considering it more wise to endeavor to preclude disease than to wait for its presence in order to save a temporary though acute pain.

ARTICLE XVII.

Case of Hare-lip. Reported by GEORGE YATES, Esq., Resident Surgeon of Queen's Hospital, Birmingham.

[THIS case was complicated, by a portion of bone projecting between the edges of the cleft, in which two teeth were placed, the whole being covered over by a cherry-like protuberance of integument. As this obstruction interfered with the proper adjustment of the edges of the wound, it was removed with a strong pair of forceps. The pins were removed on the fourth

or fifth day, and fifteen days after the operation the patient was discharged; the wound having quite healed, and little or no scar left. Mr. Yates makes the following remarks:]

Hare-lip may or may not be combined with fissure of the palate, but the two are very frequently found together. The affection always occurs in the upper lip, and it assumes various and frequently even fantastic shapes. The cleft is sometimes simple; frequently, as in Green's case, there is a middle detached portion, and now and then two or more of such prominences. The cause of the disease is not obvious; it is most commonly attributed to an arrest of development; and is sometimes seen occurring in the same person or family, with malformations of the bladder, penis, feet and other parts. Sometimes the affection appears to be hereditary. Why these malformations occur we cannot say, and the answer generally given to the question—viz. that it is an arrest of development—is no answer at all, but only a statement of the fact itself.

Of course, there is but one mode of treatment to be adopted in these cases; but it is an important question, concerning which there is some difference of opinion, whether the operation should be performed while the child is young, or at what time of life it should be resorted to. Some would perform the operation before dentition commences. Lawrence "thinks it very desirable to remove the defect early on every account." Fergusson appears also to be an advocate for an early operation; but, on the other hand, Sir Astley and Samuel Cooper "recommends that the operation should not be undertaken till the child is about two years old, and has cut its teeth," because of "liability of young infants to sloughing, diarrhea, fever, and particularly the danger arising from hemorrhage and convulsions, which latter state is sometimes only to be checked by the removal of the threads, and allowing the original gap to be produced."

The propriety, however, of operation of the age of two years may well be questioned, as a child of that age is generally a very restless being, and not so likely to remain quiet as though only a few months old, nor nearly so readily to be confined and

kept in order. Then, considering the dangers of operating on very young children, it would seem most proper that the operation should be put off for some years, or, at all events till such a time as the child may be able to understand the importance of remaining quiet, and aiding the surgeon as much as may be in the after-treatment of the case. The age, therefore, varies at which the operation may with most propriety be attempted, somewhat advanced age being perhaps preferable, next infancy, and lastly childhood. There is one circumstance, however, which must not be overlooked in coming to a determination regarding time, viz. that the fissure of the palate frequently closes of itself after the lip has been operated on during infancy.

The operation, however it may be performed, is intended to bring two surfaces previously ununited together, and for this, of course, an abrasion must be produced; but when there is a middle projecting portion, as happened in the case related, it becomes a question whether it should be taken away or left, and authorities are not agreed on this subject. Much, of course, must be left to the judgment of the operating surgeon, and it sometimes cannot be decided until the edges of the fissure are pared and approximated, whether it is proper to cut the projecting portion away or not. If the edges of the lip will come together nicely over the projecting portion, and without too much stretching, it may then be advisable to leave the part, especially as in some cases the contour of the face would be improved by such proceeding; but if it causes stretching of the parts, and projects more than is convenient, removal must be accomplished, care being taken not to cut away too much, lest falling in of the lip occur. Cooper says, "when the jaw itself projects, the common preliminary step to the operation consists in cutting away the bony prominence." Chelius also gives the same opinion. Fergusson, however, is adverse to removing the part totally; and Desault also objects to the proceeding, "the measure being seldom proper," in the opinion of this latter authority, who prefers "reducing the projection of the jaw by means of the pressure of a tight bandage," or, as in a case re-

lated in "Cooper's Dictionary," the projecting bones may be pushed backwards by means of a "spring truss, worn daily for several hours." Of course, these means are to be put in requisition some time before the actual operation; but they must be both tedious to the surgeon and irksome to the patient, and the writer cannot see that they are preferable to a slight use of the forceps or bone nippers. Gensoul, however, recommended the bending back of the projecting portion, and Mr. Haynes Walton has put the recommendation in practice with success, by partially dividing the projection, and then pressing it backwards.

Med. Times and Gazette.

ARTICLE XVIII.

On a New Caustic in Malignant Ulcerations of the Face.

M. E. Cazenave, of Pau, relates, in "L'Union Médicale" for 22d January, two cases of malignant ulceration of the face, in which he has successfully employed a local application, made from sulphuric acid and powdered saffron. The remedy is formed by pouring the acid on the saffron, and applying it in the form of a soft paste. Its corrosive action is immediately manifested on the diseased tissues; the paste dries, and falls off in two or three days, in the form of black crusts, which carry with them the eschar. The application is made several times; the wound assumes a healthy red tint, and cicatrization takes place. In one case, a year has elapsed, in the other two years; and the disease has not returned.

The efficacy of this treatment is evidently dependent on the sulphuric acid; which, we believe, would succeed equally as well if made into a paste with common flour, or any ligneous powder, as with saffron. A paste of sulphuric acid and flour would be worth trying in obstinate cases of phagedemic ulceration.—*Association Med. Jour.*

ARTICLE XIX.

On Elective Elimination by the Salivary and other Secretions. By M. CL. BERNARD.

IN this paper Mr. Bernard calls attention to the fact, that some of the secretions rapidly eliminate certain substances, while other substances, equally soluble, are either eliminated much more slowly, or not at all. He relates the result of a series of experiments, in which iodide of potassium, iodide of iron, lactate of iron, cane and grape sugar, and yellow prussiate of potass, were injected into the veins, and the various secretions then tested for their presence.

Of these, *iodide of potassium* appeared, at latest, in from 30 to 40 seconds in the saliva, and was also rapidly observed in the tears and pancreatic juice. It required more than an hour to become detectible in the urine or the bile; and if injected in very small quantities, was not found in these at all. Introduced into the stomach, and especially fasting, it was found in the saliva in 1½ minute. The *yellow prussiate of potass* was not discernible in the saliva, while in seven minutes it was found in the urine and abundantly eliminated; the serum of the blood also exhibiting a notable quantity in an hour and a half. It was also found in the bile, while, although it was thus circulating in the blood, no traces of it could be found in the pancreatic juice. *Grape and cane sugar* never passed into the saliva or pancreatic fluid, while it was manifested in the bile and urine, though less rapidly than the prussiate. As various authors state they have detected sugar in the saliva in *diabetes*, the author examined that of several such patients under M. Rayer's care. In none was sugar detected, although the bronchial mucus and sputa evidently contained it. The *mammary gland*, which in the normal state contains the sugar of milk in its secretion, refused passage to grape or cane sugar, even when these sub-

stances existed in large quantities in the blood. A saturated solution of *lactate of iron*, thrown into the veins, never gives rise to iron in the saliva; but when the iron is injected as an *iodide*, it obtains admission into the saliva, both the iron and the iodine being then detectible.

This expulsion of certain salts by this or that secretion, is not the only peculiarity the history of elimination presents. Some substances are eliminated rapidly and completely, while others remain within the tissues for a more or less long period. It is well known that certain of these, as mercury, antimony and arsenic, become localized in certain organs—*e. g.*, the liver—and are then gradually eliminated; but it has not been noted that others, as the iodide of potassium, which are perfectly soluble, and remains soluble in the economy, wherein they circulate without enduring any accident, may remain for a certain time in the substance of the organs. Two or three weeks after iodide of potassium had been introduced into the stomach of several dogs, and long after its supposed entire elimination by the urine, in which it had ceased to appear, it was found in the saliva and gastric juice. If, however, purgatives were employed after administering the iodine, it ceased to be detectible in a few days in any of the secretions.—*Archives Générales*, N. S. vol. i, p. 5.—*Brit. and For. Medico-Chirurgical Review.*

ARTICLE XX.

Development of the Teeth.

A very interesting paper on this subject has appeared in the third number of the *Journal of Microscopical Science*, p. 149, from the pen of Mr. T. H. Huxley. Our readers are doubtless aware that the dentine, or proper substance of the tooth, is usually supposed to be formed by ossification of the cells of

the pre-existing pulp, and consequently by layers added *within;* while the enamel is considered to be superimposed on it *from without* by a secreting layer, the "enamel organ," folded over the crown of the tooth. This account Mr. Huxley contradicts; the main object of his paper being to prove that the dentine is formed, not by ossification of the pulp, but rather by a process of deposition in, or on its outer layer, and that the supposed "enamel organ" has no function such as that attributed to it, the enamel being separated from it by a membrane (the persistent capsule of Nasmyth) and formed, in some manner not yet explained, on the surface of the crown of the tooth. An analogue of this he finds in the dermic bones of the skate, where there is distinct enamel, and no "enamel organ" whatever; and he brings out the fact by actual observation of the teeth of man.

If a young tooth capsule be opened, it will always be found that a space filled with fluid exists between the inner surface of the capsule and the outer surface of the pulp. The two are perfectly free from all adherence to one another; the only substance between them, besides the fluid, being a more or less abundant whitish matter, which sometimes adheres to the one and sometimes to the other. If the tooth be very young, a structureless membrane may be traced over the whole surface of the pulp; and it is not at all difficult to trace this in perfect continuity on the inner surface of the walls of the capsule.

The whitish substance, just mentioned as lying in the closed sac formed by the membrane so reflected, is delicate, friable, composed of cells, and, in short, is plainly the altered epithelium of the reflected membrane; it is this layer of epithelium which has been dignified with the name of "enamel organ," and invested with the function of secreting or forming the enamel.

Mr. Huxley next proceeds to inquire into the relation of the dental tissues to the tooth-capsule.

If a very young tooth, say from a fœtus of the seventh month, be carefully examined, especially after the addition of acetic acid, under the microscope, the thin cap of tooth-substance may be seen to be everywhere covered by a very delicate membrane,

evidently continuous with the reflected capsule described above; and the *enamel fibres* can be distinctly seen *under* this delicate membrane; making it of course obvious, that the so-called enamel organ, being *above* the membrane, can have no such function as that attributed to it. Between the dentine and enamel no trace of membrane can be found.

The next question examined into is that to which we have already alluded—the exact mode of formation of the tooth-substance from the tooth-pulp.

The dental substance, our author holds, is not formed by simple ossification of the cells of the pulp (Nasmyth,) but is deposited within the pulp in definite masses, the gaps between which eventually constitute the dental fibres, *parenchymate materiam suppeditante* (Raschkow.)

When the ossifying boundary of a tooth-pulp is examined, it is seen that where dentification has not begun, the membrane so often mentioned is in immediate contact with the substance of the pulp, which is composed of a homogeneous transparent base, in which closely arranged nuclei are imbedded. Passing towards the ossifying edge, we see in the profile view a clear, more strongly refracting layer, gradually increasing in thickness, which begins to separate the proper substance of the pulp from the investing membrane, and is the young dentine, as transparent as glass, and at first quite structureless in appearance. No trace of "nuclei" can be seen in it; the bodies which have been described as such, being, according to Mr. Huxley, simply lacunæ, and being afterwards found to form the canals of the dentine. He "believes that these facts afford sufficient demonstration that the pulp is *not* converted directly into the dentine; and that the structure of the latter does not depend upon the calcification of pre-existing elements."

In a morphological point of view, the relations of the *cement* show it to be homologous with the enamel. In a very beautiful section of a human tooth from Mr. Busk's cabinet, the upper portion of the cement exhibits in places a very distinct transverse striation, resembling its perfect enamel; and in the tooth of a young calf the transition of the one structure into the other

was well shown. The enamel and the cement, therefore, according to Mr. Huxley, are formed on the surface of the dentine, not by the "enamel organ," but in some way which he does not explain. Is it not possible, that not the epithelium, but the very membrane itself, is the agent?

In conclusion: the tooth-pulp being a protrusion of the dermic tissue of the gum, and the capsule an involution of the same, the reflected membrane is the analogue of the basement-membrane of the mucous lining of the mouth, and the "enamel organ" merely its epithelium, inclosed in the sac formed by the involution of the capsule.

The teeth, therefore, are true dermic structures, and are analogous to the hair.—*Amer. Jour. Med. Science.*

ARTICLE XXI.

Memoirs on a few Fundamental Points of Dental Medicine, considered in its Application to Hygiene and Therapeutics. By A. F. TALMA, M. D., Dentist to the King of Belgium, &c. Translated by C. A. DU BOUCHET, M. D., D. D. S. First Series. Brussels, 1852.

[Continued from October Number.]

THE diseases of milk teeth frequently become the cause of accidents or complications, which hinder and render laborious the second dental eruption. The caries of the incisors and canines is generally of little importance, and may be neglected without inconvenience. Such is not the case with the molars. Among children, these teeth frequently decay several years before the natural epoch for their being shed. At the commencement of the caries, when the alteration of the tissues is still very limited, and when pain has not yet been experienced, it is proper, if the disposition of parts allows it, to fill them with

much care. This operation has the twofold advantage—first, to preserve for a longer time organs useful for mastication, and the regular development of the dental arch; second, to save the patients those frequent paroxysms of pain, which must have a bearing upon the health. Beneath the metal obturating the caries, and sheltered from the contact of air and articles of food, the morbid labor is checked, if not entirely stopped, and the dental pulp is gradually destroyed in an insensible manner.

When the caries is already deeply seated, and when the cavity it has dug out is painful, or merely irritated by the contact of an instrument, a favorable opportunity to fill it no longer exists. At this period, the operation of filling would almost infallibly cause the exasperation of the morbid condition, constant abscesses, or other accidents, which might render a premature extraction necessary. It is essential to avoid such a result or termination.

As a sequel to such affections, in lymphatic or cachectic children, it is not rare to notice the appearance of denudations of the alveoli, and partial necrosis of the alveolar ridges, or even complete necrosis to a lesser or greater extent. The inflammation of the teeth is gradually extended from the gum to the periosteum, thence to the bony tissue, and causes denudations, and sometimes ill-looking ulcers, recalling certain forms of cancer. The permanent teeth, making their appearance under such circumstances, often remain loose or require to be extracted soon after their eruption. We should add that the affections we have spoken of are the more ordinarily local, and do not appear to have any bearing upon the system.

A strengthening diet, bitter tonics, detersive applications, a great cleanliness of the mouth, and when the pain becomes intolerable, the extraction of the carious teeth, are the means to be employed to obtain a restoration to health of the diseased parts.

I must not omit, in closing this paper, a general remark of the highest importance; I have constantly noticed, that in cases similar to those just now described, hygiene, either as a prophylactic or curative means, is the most useful and rational

remedy. Not only the constitution of the teeth, but also their easy eruption, are dependent upon the conditions of health and vigor of the young subjects. Delicate, irritable children, born and raised in large cities, suffer most by their second dentition, as well as by their first. Hence the necessity of creating or establishing for them, as far as possible, a healthy and vigorous constitution, by means of continual exercise in the open air, frequent baths, healthy food, and a well-regulated physical education.

III.—*Anomalies.*—I shall but briefly allude to the anomalies of which the teeth have given examples, respecting the various periods of their appearance, their number, their continuation in the mouth, or their shedding. Most of these deviations from the general, natural law, depend from individual organic conditions, so deeply hidden that, most commonly, we can only oppose their results, but are unable to prognosticate them and oppose prophylactic means.

Like that of deciduous teeth, the eruption of the permanent teeth is precocious or slow. A great number of celebrated men are cited by biographers as having been born with incisors and even molars. Louis the Fourteenth was like the first, and Mirabeau like the latter. Among the ancients this phenomenon indicated an uncommon vigor, and, although comprising many exceptions, this belief is, however, in conformity with the most general observations. As regards the second dentition, it is not rare either to see permanent teeth cut in advance of the usual time, even at times when the corresponding deciduous teeth are yet perfectly firm, or to observe their tardiness to appear long after the premature loss of the deciduous ones, or even their entire deficiency. M. Duval relates the extraordinary case of a magistrate of Frederichstadt, who never cut his permanent molars, and was entirely deprived of incisors and canines.

I have seen an upper canine cut at the age of twenty-five, two inferior bicuspids at thirty, and wisdom teeth, in the case of a lady, at sixty. There is hardly any dentist who has not witnessed anomalies of this kind, of which it would be difficult

to give a satisfactory explanation. For it cannot well be understood on what account the growth of certain teeth, arrested during many years, should resume, at a given point, its activity, increase the length of their roots, and compel the part clothed with enamel to burst forth and overcome the very considerable resistance of the tissues completely covering them.

The delay noticed in the eruption of deciduous teeth, sometimes appears to be in consequence of the weakness of the constitution, and the debility of organic movements in certain lymphatic and delicate subjects. M. Duval has related a case precisely in point.

Alphonse Leroy has also stated, in his "Treatise of Maternal Medicine," that the dentition is delayed, if the child be puny and the issue of debilitated parents, or insufficiently fed.

The want of permanent teeth has been noticed, not merely partial but total. It may depend either from the primitive absence of dental germs in the fœtal organization, or from diseases severe enough to destroy those germs, during the early periods of life. M. Oudet has found, in his anatomical researches on the fœtus, the dental germs inflamed and suppurating, and as this skillful observer remarks: "There is not much question that, had those subjects lived, they would have been deprived of the teeth whose rudiments were thus destroyed, or in process of destruction." These facts recall what I have already mentioned in regard to the influence exercised by pathological affections, more or less grave, on the teeth undergoing the process of formation. In such cases, where that influence is exerted to a high degree, the teeth, instead of merely undergoing alterations in their tissues, may be completely destroyed. M. Maingault has related the case of a lad of the age of eighteen, whose permanent teeth had not yet appeared. M. Murat saw an adult, whose deciduous teeth, almost entirely worn off, still persisted.

"Nature," says with much reason, M. Duval, "sometimes preserves deciduous teeth to fill the place of permanent ones. The roots of such teeth are not absorbed like those that are shed, and they remain, *in situ*, with some mobility. Usually

shorter, more yellow and worn than the others, they remain in the mouth until the age of forty and upward. This phenomenon is observed particularly in regard to the deciduous molars; it is very important to bear it in mind, so as not to uselessly extract them."

The cases in which deciduous teeth are either not shed, or are so at a late period, are exceptions, but they are numerous enough to deserve notice.

The exaggerated number of teeth is most ordinarily owing to the abnormal persistency of a few deciduous teeth, anteriorly or posteriorly to which the permanent teeth were to arrange themselves. These cases, not uncommon, merit all the attention of the operator. The deciduous tooth should be removed in every case rather than sacrifice a permament one; the permanent tooth will naturally, or with the assistance of art, resume its usurped place. But it is not always perfectly easy to discriminate which is which, and I have seen in similar cases, very deplorable mistakes made. Although paying due attention to the account of the case, as related by the patient or friends, the dentist should make a very thorough examination of the characteristics of the teeth regarding which any doubt may exist. Permanent teeth, relatively to deciduous or milk teeth, are more voluminous, of a less milky white, of a more solid appearance; not having undergone wear by usage, their anfractuosities are sharper. These peculiarities, which habit teaches us how to distinguish, must be noted with care, in order to avoid grave errors, unluckily too often committed.

Real supernumerary teeth are rare. Besides, the fabulous cases of double rows of teeth related by the ancient writers, more modern ones have been mentioned, which we cannot reject. * * * * * *

When supernumerary teeth produce neither deformity nor inconvenience of any kind, we should not interfere with them. But when they do, which usually happens in regard to canines, and far more so in the case of molars, art must be put in requisition. According to the situation and direction which they assume, supernumerary teeth frequently hinder the mo-

tions of the tongue and cheeks; they irritate those parts, ulcerate them sometimes, and become the incessant cause of suffering, or, at least, great inconvenience. In such cases the indication is obvious; they must be extracted, although the operation may not be exempt from difficulties.

Among the anomalies sometimes presented by teeth of the second dentition, I could not omit the union, or rather confusion, of several teeth into one. The cases of dental rows composed of one single piece, related by the ancients, must be rejected by sober science. But it is not the same with the isolated soldering of a few teeth in consequence of the abnormal approximation and growing together of their still vesicular germs. M. Oudet, and several other dentists, have observed cases of this kind. The most remarkable I have noticed, was a central and a lateral upper left incisors, inserted into one large tooth, with hardly any indentation at the line of junction. M. M. Desirabode thinks that the canine and lateral incisors are the teeth most liable to unite. These cases are curious, but offer no practical indication.

The annals of science have preserved the history of a few aged persons in whom nature has retrieved, by the means of a sort of third dentition, the loss of adult teeth worn out by age, or spontaneously expelled by the atrophy of the gums. These supplementary productions, extremely rare, are almost always irregular, partial, and more or less deformed abortions. Their development is seldom a benefit, and they furnish no useful assistance in the performance of functions. Far from that, scattered upon a barren alveolar ridge, without support from neighboring teeth, having no antagonists in the opposite jaw, loosely set in their position, they usually rather hinder mastication than facilitate it, irritate the gums, and even sometimes cause such inconvenience that their extraction becomes imperative.

We do not see these anomalies only among the aged subjects; sometimes, also, children and adults display these freaks of nature. Among the most curious examples of these multifarious dentitions, I will quote that, which a respectable practitioner has related in the *Bulletin de Therapeutique*, for September,

1837. This fact exhibits at the same time, the exceptional fecundity of nature and the fragility of its too often repeated products. This case is that of a child, thirteen years old, whom the doctor has seen and known from his birth. This child, says Dr. Licon, a physician of Donzy, accomplished his second dentition at the age of nine. Soon after, several teeth became loose, and displayed new teeth. The twenty-eight teeth were thus shed and renewed in a short time. Between the age of ten and eleven, the same phenomenon occurred a second time. From eleven to twelve, same shedding and removal of all the teeth. Finally, at the time when that child reached his thirteenth year, a sixth dentition was progressing; the first large molar being shed, being expelled by a similar one, quite visible. The teeth which nature thus renewed so promptly had no roots; they seemed to have been entirely absorbed; destroyed. Their shedding and the consecutive eruption took place in the usual order. The child was well, and experienced no annoyance. The gums, over-taxed by this continuous labor, were rather red and swollen. The teeth were small, white, and regularly arranged.

We cannot doubt but facts of this kind arise only from an abnormal prodigality in the number of germs intended for successive development. Lemaire found at the extremity of the root of a superior canine, which he extracted for a girl of sixteen, three other much smaller teeth, which had grown with the former. M. Oudet, having removed a voluminous tumor, implanted at the right side of the lower jaw, found it to contain at least twenty-five teeth, distinct from each other in form, position and direction. They were united together either by direct contact, or by a solid reddish-yellow substance. It is evident that in this case, had circumstances permitted, there would have been, as in Mr. Licon's case, a series of more or less numerous dental eruptions, probably quite as imperfect.

However, cases of this description are far from being all properly authenticated. The fondness of men for the marvelous must have allowance made; we can appreciate these cases only from accounts relating to distant periods, and it is not

strange that with the help of the imagination, the mere approximation of two neighboring teeth may have been taken for a new eruption. The dentist would commit a very serious error if, supposing such exceptional facts to be positively exact, he lightly and without absolute necessity sacrificed, even in the case of young subjects, permanent teeth, in the hope of seeing them replaced by new ones. Nature does not thus keep in reserve, at our wish, supplementary follicles, in order to retrieve eventual losses. In this respect, there is no more prospect of replacement for adolescence than for old age.

IV.—*Arrangement of the Teeth.*—Having prepared, as far as practicable, by hygienic cares, a good constitution and the easy eruption of the permanent teeth, overcoming, according to the nature of the case, the accidents which may follow from the eruption of these organs, it is important to follow and observe with care the progress of the second dentition, so as to prevent or correct in the outset the irregularities which may occur.

Owing to an admirable mechanism, nature, although maintaining during first infancy the anterior portion of the dental arches in the same dimensions, has not, however, debarred the body of the jaws from the general laws of organic development. On one part, the deciduous teeth have been enabled to preserve, until being shed, their primitive relations, and on the other, the deeper soil—if I may thus express myself—inclosing, and from which the permanent teeth are to issue forth, has increased in proportion to the size required by the latter. This enlargement, which continues until the complete formation of the bony structure, proceeds in every direction, and carries the maxillary angles backwards as well as the symphysis forward.

The special labor for the growth of the germs and crowns of the permanent teeth constitutes, for the jaws, and especially for the alveolar ridges, a local cause, active and powerful, for development. Larger than their predecessors, the permanent teeth make for themselves, by main force, thus to speak, the room necessary for them in the dental arch. Hence the advantage resulting, for their regular arrangement, from their

erupting successively and in proportion to the motion of extension operated in the whole system.

I propose to explain, in a subsequent memoir, with all the requisite details, the history of the multifarious causes, more or less deeply situated, occasioning the deformities of the mouth, which the dentist may be called upon to remedy. I could, at this point, indicate those causes, but in an incomplete manner, making myself liable to useless repetitions. I shall, then, now confine myself only to the direction of second dentition, in the most ordinary cases, and beyond, the normal organic dispositions which may interfere with it.—*Dental News Letter.*

[To be continued.]

QUARTERLY SUMMARY.

DENTAL SCIENCE.

1.—*Dental Patents.*—Professor Townsend's Essay on Dental Patents, read before the American Society of Dental Surgeons at their annual meeting in August last, was published in the October No. of the Dental News Letter.

After quoting from Bouvier's Law Dictionary the definition of a patent, Prof. T. goes on to review the law of patents, and to show that its main object is to induce the ingenious man to make public whatever invention or discovery he claims as his, and which is calculated to promote the progress of science and the useful arts, by protecting his right to the exclusive benefits which may result therefrom for a period of fourteen or twenty-one years. He regards the law as looking to the justice due to the public *as* carefully as to the rights of particular individuals, and that the monopoly is granted for such period of time as it is supposed may operate as an inducement to reveal the secret at once for general use. He points out

the manifest injustice of a perpetual monopoly, which would deprive any subsequent discoverer of the same thing from enjoying the benefit of his equal ingenuity and labor. He thinks fourteen years is quite as much as any man is likely to anticipate the invention of other men engaged in similar pursuits. There is, indeed, nothing more common than for the very greatest discoveries to be made almost simultaneously by a number of persons in different parts of the world, or under circumstances which preclude the idea that either is indebted for the hint to another. He considers patent-rights a mere matter of policy, and that no man has any such right, in natural justice and reason, to the monopoly which it confers upon him, and that it properly applies only to those combined results of *knowledge and skill* which produce physical, material, or mechanical results.

Copy-right and patent-right do not stand at all upon the same ground. Although the author is protected by copy-right for a certain time, it does not, in the nature of things it cannot, forbid any other use or employment of the ideas and language of the book, except the tradesman's profit in their republication, in form and substance as they came from the pen of their author, and whatever is essential is subject to remoulding, recombination, reapplication, etc. It is not so with levers, springs, wheels and pullies, and the compositions of chemical elements which patent-rights protect. Coyy-right is not a conflict of interests between an author and the profession for which he labors; but the patentee stands before the world a monopolist of all the value that there is in his invention.

The professor takes the ground that dental patents, applying as they do to the mechanical department of our art almost exclusively, lie wholly within the sphere, and are governed by the laws of *patent-right*, and have no pretension to rank with the principles and subjects of our science, properly distinguished. *As such*, they are not forbidden, either by civil law or individual duty to the mere inventor.

The patentee has no interests in common with the profession, and not being bound by reciprocities of respect and duty, he may hold his wares at *such* price, and I may purchase them on the same ground that I would any other advantageous contrivance, etc., but no idea, principle, or feeling of the profession, and its relations, may justly mingle in the business.

Instead of coming as a brother, the patentee shelters himself behind a piece of parchment furnished by the United States govern-

ment, warning each and every person against trespassing upon his patented rights. Such persons throw off the character of the dentist and assume that of the mere dealer in wares.

Not so, however, with the author who has secured a copy-right. His ideas are intended to be used by the profession, and he is always gratified in receiving useful hints from his brethren.

"Thus patent-right and copy-right are broadly different in all their bearings upon the interest of the profession, and upon the relations of the practitioners of dentistry."

The faculties of medicine and surgery are united in their opposition to patent medicines, and the American Medical Association declares, that "it is derogatory to the dignity of the profession for a physician to *hold* a patent for any surgical instrument or medicine, or dispense a *secret nostrum,* whether it be the composition, or exclusive property of himself or others. For, if such nostrum be of real efficacy, any concealment regarding it is inconsistent with benificence and *professional liberality;* and if mystery alone give it value and importance, such craft implies either disgraceful ignorance or fraudulent avarice."

Ours is a legitimate branch of the healing art, and dental patents should not be allowed among us. They have been condemned by the "Mississippi Valley Association," the "Pennsylvania State Society of Dentists," and by the prominent members of the profession generally. It is the duty of members of the profession to lend and give, as well as to borrow and receive.

If from labor, thought, or good luck, a member of the profession has made an important discovery or improvement, and wants the profit of it, he should publish under a copy-right, not take out a patent. But few really great discoverers have ever been able to make anything for themselves out of their special privileges, while "hucksters and pedlars have fattened on their ingenuity."

As the consulting physician imparts his knowledge freely to his professional brother for the benefit of the patient, so is the dentist in honor bound to do the same. The vender who sells a secret, and he who buys, both put themselves out of the profession.

"All dental associations, colleges and practitioners, who have the responsibilities of the profession upon them, and enjoy any of its benefits and honors, should unhesitatingly put dental patents under ban, and treat them as they properly do all other monopolies in the industrial and liberal arts, as things outside of the pale of the fraternity."

2.—*Treatment of Exposed Dental Pulp preparatory to Filling.*—(Continued from page 123, Oct. No. of Journal.)—Professor White, in speaking of the various means which have been adopted for the treatment of the pulp when exposed, says, that his experience in the treatment recommended by many dentists in the use of astringents and capping, has been the same as that of Professor Harris, viz. that only about one case in four has proved successful, and at least as many would be saved without any previous preparation. Mr. Maury's success in the use of the cautery he attributes to the fact that the nerve is destroyed, and most of it removed by the instrument which is passed into the cavity, and that when the nerve is removed far down into the cavity, the bleeding will cease in a few minutes, or hours at most, and this may be as effectually accomplished by a *cold* as a hot instrument, for in either case the pulp is destroyed. Where it can be properly applied, he considers the *actual* cautery the best means of destroying the pulp, particularly in the roots of the front teeth where one application will be sufficient; but he does not use it now excepting in the preparation of those roots for pivot teeth. Care is required in using it that it does not come in contact with the parietes of the internal cavity, or retained in it unnecessarily, or the heat caused thereby may produce inflammation of the alveolo-dental membrane, followed by abscess. Acute pain may be the result if the pulp be but partially destroyed; but when entirely, the pain immediately ceases.

Stimulants, as recommended by Mr. Bell, who is opposed to the use of the actual cautery and corrosive acids, the professor is not prepared to adopt. If their continual application will but gradually, as is asserted, wear away the sensibility of the membrane, their effect is as uncertain as the application of astringents; but if they cause absorption of the whole pulp, they succeed upon the same principle as that of the cautery, properly applied. Formerly, Prof. W. was in the habit of inserting a small gold tube in his fillings to give free exit to the accumulated fluids in the pulp cavity, upon the same principle that some now perforate the neck of a tooth with a small drill; but having discovered that he could destroy the pulp without rendering the tooth a useless foreign body, he has abandoned it.

The Concentrated Acids.—Of these, arsenious acid is most commonly used, and the professor thinks it the best agent when properly combined with other substances, as it can be applied with the

same facility to the back, as to the front teeth. When applied by itself, it does not necessarily destroy the vitality of the nerve, but produces intense pain and acute inflammation by being taken up by the absorbents, requiring the immediate removal of the tooth, and consequently its use has been opposed by the best dentists. Whatever portion of the pulp is destroyed must be removed, otherwise it will cause inflammation.

Arsenious acid, kreasote and morphia is, perhaps, the best form of using arsenic.

℞.—Arsenious acid, gr. xxx.
Morphia sulphas, gr. xx.
Kreasote, 2 S.
Misce.

"Put the arsenious acid and kreasote in a glazed mortar, and grind them till the arsenic becomes impalpable, (adding kreasote to keep the mass of about the consistency of cream,) then add the sulphate of morphia, and mix it well, still adding kreasote; it will dissolve in the paste. Prepared in this way, the arsenic is in better condition to unite speedily with the pulp than the mere dry powder of arsenic, on account of the kreasote holding a large quantity of it in solution, and it becomes more minutely divided. Great care must be taken to cleanse out the external cavity of the tooth, so as to place the paste in immediate contact with the pulp. A pledget of cotton about the size of a small pin's head, steeped in the paste, is sufficient. If the pulp bleed when the cavity is cleansed, wait until the bleeding subsides before applying the paste; the cavity may then be filled with cotton, and left in from ten to twenty hours." In a young patient, remove the paste in much less time.

This form of using arsenic destroys the pulp in less time, with less pain, and less inflammation of the external membranes than when applied alone, and causes a more extensive and perfect slough of the pulp, which can be removed far down in the roots, on which depends very much the success and permanency of the operation. The pulp having been removed, a period of from three to six days is usually permitted to elapse before plugging it, in order to remove the clot of blood which may be formed, and otherwise securing a proper condition of the cavity, which should, in the mean time, be stopped up with cotton, and not used in mastication. In one hundred cases treated in this manner in 1842, but sixteen gave pain, averaging for each one hour. Six of the whole number have since been extracted on account of alveolar abscess. The paste should

never be applied in the teeth of a patient, where, from the age, we have reason to think that the roots are not yet fully developed.

3.—*Deposition of Ivory in the Wounded Tusk of an Elephant.*—W. D. Porter, U. S. N., and Surgeon Dentist, in a letter published in the Dental News Letter for October, states that there is in the possession of S. G. Willing, of New Rochelle, New York, the tüsk of an elephant, wounded by an iron ball of an half ounce weight, and a half inch in circumference, the ball passing an inch and a half through the enamel and ivory, through the nerve cavity, and lodging on its opposite side in the ivory. Nature has performed a cure by depositing bone or ivory. The ball shows a black oxyd, and that portion of it exposed in the nerve cavity has an ivory covering.

Mr. Porter had caries removed from one of his molars fifteen years ago, and the cavity being very narrow, he ordered a long incision to be made and left without a filling, and had the dens sapientiæ removed in order to test the renovation of both ivory and cementum, and the result is that the tooth has entirely recovered. The above facts remove all doubt from his mind as to the renewal of both the ivory and enamel of the teeth under certain circumstances.

4.—*Freak of Nature.*—J. F. Terry, of Tecumseh, Michigan, in a note addressed to the Dental News Letter, says, that he had just examined the mouth of a girl six years of age, in which there are six perfect incisors in the inferior maxillary of the temporary set, with cuspidati and molars as usual.

5.—*The Insertion of Teeth upon Platinum Pivots.*—In an article from Frank Fuller, of Portsmouth, New Hampshire, published in the Dental News Letter for October, he recommends the following mode of inserting pivot teeth, viz.

"Having selected the tooth, and adapted it, by grinding, to its place of destination, I take a piece of platinum wire, about one-third smaller than the pivot-hole in the tooth selected, and file upon its surface, at one end, a few irregular notches; inserting the notched end of the wire in the tooth, and placing it in the centre,

or at either side of the cavity, according to the necessities of the case, I proceed to pack around it, by the aid of proper plugging instruments, as large a quantity of jeweller's "soft enamel" as can be introduced. This being done, I imbed the tooth, with its cutting surface down, in plaster, to which has been added a quantity of sand or asbestos, leaving only the pivot and the orifice of the pivot-hole, with its contents exposed. Heating the job in the furnace, to redness, to expedite the process, I remove and apply the blow-pipe, until fusion of the enamel occurs. The tooth, when cooled, will be found to be firmly connected to the pivot by the intervening enamel, and will resist every force which may be applied for its removal. I proceed to cut the pivot of a proper length, file to a square form, and point it, and cut from the butt of the tooth towards the point of the pivot, numerous barbs, to retain it more firmly in its place. I then fit a piece of some close wood—of which I prefer the locust—to the cavity previously formed in the root, in the usual manner, push the pivot to its place, and have a firm, substantial, and elegant piece of work.

"The pivot can be filled to any shape, and bent as may be desired, and thus an accurate adaptation of the tooth to any case is insured. I should have preferred, however, the gold to the platinum, for various reasons, were it not for its liability of fusion from the very considerable heat employed. The soft enamel can be obtained of some of the watch-makers in our larger cities, or by pulverizing the enamel of an old watch-face."

6.—*Caries of the Teeth.*—Prof. J. Taylor's answer to Dr. Drake's interrogatories, was continued in the October No. of the Dental Register. Dr. T. proceeds to consider the question, "What is the effect of repeated salivations on the teeth and gums?" Mercury in its pure state has no affinity for the teeth. Analysis proves this, and teeth immersed in this substance for months show no signs of decomposition. This fact being established, the numerous cases of tooth-ache which occur after an attack of sickness, and which are so often attributed to mercury, must depend upon other causes rather than the direct chemical action of this medicine. The most reasonable conclusion is, that such teeth have been decaying for some time, but during healthy operation of the economy, no just cause for derangement has occurred, and hence no pain—but the indis-

position which rendered it necessary to take medicine, has vitiated the secretions of the mouth. Acting as irritants, the teeth thus affected, they result in tooth-ache. An analysis of the saliva of a patient laboring under mercurial ptyalism seldom shows an acid reaction; but teeth already decaying may have the disease accelerated by such condition of the secretions, although sound teeth would not be more affected thereby than under any other derangement of the healthy condition of the mouth. In many cases where persons have been badly salivated two or three times, the teeth remain perfect. The injurious effect of salivation upon these organs during the period of formation, causing diseased action, which interferes with their development, has already been referred to.

The injury to gums from repeated salivation is not doubted. It causes inflammation and swelling of the gums, thickening of the periosteum of the teeth, teeth raised in their sockets and loosened, separation of the gums from the necks of the teeth, thickening of the alveolo-dental membrane, absorption of the alveolar processes, and wasting of the gums. One or all of these conditions may be produced.

The opinion expressed by Prof. Bond, in his work on dental medicine, in regard to the non-injurious effects of mercury on the teeth is quoted as satisfactory.

What are the effects of tobacco on the teeth, and are those of chewing and smoking the same?

In its pure state, the use of tobacco is not injurious—excepting where a constitutional diathesis and a predisposition to decay exist—but preservative, the friction produced by chewing it keeping the teeth cleansed. While the friction abrades teeth, it also preserves them, as those teeth used most in masticating our food are always the soundest.

Prof. T. is opposed to the use of tobacco, and believes it to be injurious to the constitution generally, and the gums may suffer from the long continued pressure of the quid. A free use of it for a long time discolors teeth, presenting a disgusting appearance.

Smoking is considered more injurious than chewing, producing a debilitating effect upon the gums, and it is probable that in many instances serious mischief is caused by it.

Tartar.—This subject is treated at considerable length. Prof. T. thinks it probable that it is primarily obtained from the saliva as it contains nearly if not all the elements of tartar. It has been found

in the ducts which pour out the saliva, and it is usually deposited on the superior molars and the lingual surface of the inferior incisors opposite to the salivary ducts. If it were a deposit from the mucous secretions, it would be as likely to be deposited first about those teeth farthest removed from the salivary ducts as opposite to them. Delabarre's theory that tartar is caused by an exhalation from the mucous membrane of the mouth when in a state of inflammation, is not tenable. When inflamed, the mucous membrane throws out an acid secretion which gives no deposition of tartar. This acid state of the mouth is one great cause of the decay of teeth; but those most disposed to decay, are less disposed to accumulate tartar.

It is not thought necessary to allude specially to the effects of this substance on the teeth and gums, or the different effects resulting from different temperaments.

7.—*Clasps.*—Dr. B. T. Whitney, of Buffalo, N. Y., has an article in the Dental Register, for October, on the adaptation of clasps so as to prevent the loss of, or do the least injury to, teeth.

The attaching a small plate by making the bearing simply on the palatal side of the remaining teeth, although admissible, is liable to serious objections, particularly on account of the pressure being made upon the part most liable to injury from clasps, and unless very nicely adapted, the principal bearing being around the neck of the tooth, or above the central and rounded part of the crown, it will not only be too easily displaced, but is also likely to force the natural teeth outward. The exercise of good judgment in the selection of a tooth to be used for the support of the plate—without regard to the expense of the plate, or labor in fitting—will make it seldom necessary to use the file, and will give firmness to the piece.

The point most liable to injury by clasps is on the lingual surface, the labial, where the ends of the clasps are some distance apart, being free from decay or injury.

Dr. W. is in the habit of leaving as much of the tooth exposed to its native element as possible, the cleansing effects of the saliva, tongue, &c., which can be accomplished without weakening the clasps, or the stability of the plate. The strip of gold used for the clasp is as wide as the length of the crown will receive, and in length so as to embrace only so much as is really necessary for the

support of the piece. "Fit the plate intended for the base or support of the artificial teeth accurately to the neek of the tooth, so as to encircle the lingual half, or as nearly as possible, but leave a space of from one to two lines between them. The clasps is accurately fitted to the tooth, then with the plate—held firmly in its place—mark upon the clasp at the points of the plate at the anterior and posterior approximal sides of the tooth, and cut out a semicircular piece from the clasp, between these edges, leaving but a small portion to come in contact with the plate at each point, just enough to solder them firmly together." Then solder at one point only before placing the piece in the mouth to see if the position of the clasp is right, and giving an opportunity of making any desirable adjustment. This leaves the lingual side of the tooth most liable to decay or injury, almost entirely free, and is probably the best mode of avoiding injury.

8.—*Tooth-drawing.*—Dr. C. T. Cushman publishes in the Dental Register, some difficult cases of extraction of teeth. One was that of a man-servant who had been under treatment for months for what his physician termed an "unmanageable head-ache," and finally suspecting that the left inferior dens sap., which was much decayed, was the cause of the pain in the head, attempted to extract it, but broke it off below the level of the gum. Dr. C. tried Harris' forceps, slender root forceps, key and elevators, without success. The punch was then resorted to, and the *outer* side being the most prominent portion of the fractured roots, he covered the fingers of the left hand with a napkin, placed them within the mouth, clasped the left side of the inferior jaw, while the thumb placed along the margin of the gum served as a fulcrum. The punch, firmly grasped in the right hand, was then forced down as low as possible between the gum and the root on the outside, the handle depressed, then rising and pushing it toward the centre of the mouth, the roots instantly gave way. The roots were long, and periosteum extensively ulcerated, doubtless causing the long continued head-ache.

By this method of thus using the punch, Dr. C. has rarely failed in such cases, and never found it necessary to cut away the alveolus.

Case VIII was "*a stumper for the dentist.*" This was an inferior *dens sap.*, growing in such a position as to be completely dove-tailed

behind the second molar. Two persons had tried to extract this tooth without success. The tooth was firm, and no attempt was made by Dr. C. to extract it, and thinks that the *Physic forceps* would be the best instrument in such a case. The tooth would have to be forced back at least a line to clear the second molar.*

9.—*Practice of Dentistry.—A few suggestions to young men commencing, or about to commence the Practice of Dentistry*, by J. F. JOHNSTON, D. D. S , of Indianapolis, Ind., published in the last number of the Dental Register. We heartily approve these suggestions which, though oft repeated, are, unfortunately, always seasonable.

The doctor speaks of the difficulties young men have to contend with in the commencement of practice, and warns them against being sanguine that those difficulties will cease as soon as the first obstacles are surmounted. The cases to be treated both in surgical and mechanical dentistry are so various that there is always something new, and perhaps difficult or perplexing, requiring zeal and untiring energy to treat them successfully, and thus elevate, instead of disgracing the profession. He deplores the fact, that so many who are grossly ignorant of the duties devolving upon the dentist, should rush into the profession, and that others are satisfied to remain indolent instead of becoming working, energetic men. Neither carelessness nor laziness will answer for the respectable dentist. He cautions the young dentist to be *conscientious*, to attempt whatever is practicable, however difficult, to take time to do his work thoroughly—even should it prove tedious to the patient—for by so doing he will in the end secure the confidence of his patients. Those who will not submit to proper treatment are better lost than retained. Do not insert teeth in a mouth full of old roots, even if Dr. —— has offered to insert a first rate set without their removal. Let not the want of funds tempt you into bad practice. The quack may insert the teeth, but the patient will probably return to you

*In a similar case in our practice not long since, we cut freely around the crown, made a free lateral incision, and found no difficulty in removing the tooth with the root-forceps. We seized the tooth in such a manner as to cause it to glide over the posterior surface of the second molar, elevating the crown at the same time that the usual motion was applied. A number of attempts had been made to extract this tooth by a dentist in the country without success.

when they can no longer be endured, with regrets that he did not employ you at first. Success will finally attend you, and you will have the satisfaction of knowing that your patients have entire confidence in you.

In conclusion Dr. J. says, "I have been told of a certain dentist who occasionally preaches for the avowed object of saving the souls of his dear hearers; and after having discharged this christian duty, he very affectionately tells them he will save their teeth. It is supposed by some, that he comes as near saving the former as the latter, and that he saves more of the people's *funds* than either." A dentist not only can, but should be a religious man.

We have heard of a similar case in this region, with the apprehension expressed that if the preaching should prove to be no better than the dentistry, that the hearers would probably find themselves in a sad predicament.

10.—*Supernumerary Dens Sapientiæ.*—Dr. J. Richardson, of Cincinnati, states, in the October No. of the Dental Register, that he had recently extracted both the inferior dens sapientiæ for a gentleman about thirty years of age, each having four fangs, well defined in the left, less so in the right. The crowns were unusually large, and there was the usual complement of teeth in front of them. The gum on the left side was soon restored to health; but not so on the right. The patient returned some days after the latter was extracted, complaining of pain at the bottom of the cavity, soreness about the angle of the jaw, extending into the temple and neck. On a careful examination the grinding surface of an apparently well developed crown of a second wisdom tooth was discovered, occupying a position directly underneath the one extracted.

11.—*Formula for Pain in the Teeth and Jaws.*—C. P. Culver, of New Castle, Ky., in a note to the Dental Register, says that he has found the happiest effects produced by the use of the following

1 oz. hartshorn;
1 oz. chloroform;
2 dr. oil cloves;
2 dr. nitric acid;
2 dr. ex. camphor;
2 dr. ex. nutgall.

Care should be taken to prevent the discoloration of the teeth which may be caused by its use.

The editor of the Register objects to the nitric acid.

ANATOMY AND PHYSIOLOGY.

12.—*Cell Growth.*—Mr. T. H. Huxley has published a review of Schleiden and Schwann's theory of cells and their uses, in which he takes very decided ground against the commonly received opinions on this subject.

He calls in question, first, the doctrine of the anatomical independence of the cell, which he regards as simply a cavity in the intercellular substance, containing an active nucleus of vegetable tissue. He says it is "a homogeneous, cellulose-yielding, transparent substance containing cavities, in which lie peculiar vesicular bodies, into whose composition much nitrogen enters." For these he proposes new terms. The general mass which contains the cavities, and *which forms their walls*, he calls *periplast,* while the contained vesicular bodies he names *endoplast.* The cavities (commonly known as cells) he maintains to be formed, as to their outer boundaries, of periplast, and so not to be anatomically distinct, but identical with that substance throughout the plasma.

Next to the outer wall of the cell, that is to say, in close contact with the periplast lies the essential, active part of the endoplast, the *primodial utricle.* The nuclei, when present, are identical in chemical composition with this *utricle.* These, with the protoplasm, he regards as subordinate, and almost *accidental* anatomical modifications of that active element.

He denies, *in toto*, Schleiden's description of the relation of the nucleus to the cell-wall, and declares that cell-development goes on by the growth of the periplast around and between the cavities. This growth and development, in his view, are not the result of activity of the cells exclusively, but depend upon the equal extension of the periplast and endoplast.

In examining Schwann's comparison of cartilage with vegetable tissue, he attempts to show that he makes the mistake of comparing the cartilage nucleus with the plant nucleus, whereas the former is really analogous with the primordial utricle of the vegetable. The chondrin wall of the cartilage must then be the analogue of the cellulose wall of the plant, both being periplastic elements.

The periplast he regards as the seat of all the most important changes which take place. By its differentiation, all the changes, whether morphological or chemical, are produced.

Its chemical metamorphoses may be either of *conversion*, as when cellulose is changed into xylogen, or of *deposit* as when silica or calcareous salts are introduced into the tissues.

The structural metamorphoses are classified under the heads of *vacuolation*, or the formation of cavities, and *fibrillation*, or that change which produces a tendency to break up in certain definite lines.

In the development and exposition of these notions, he introduces several facts very much at variance with received doctrines. He describes muscular fibre fading insensibly into tendon, or branching and terminating in stellate bodies belonging to the connecting tissue.

13.—*Histolysis.*—Under this head, in the annals of micrology of the *British and Foreign Medical and Chirurgical Review*, Mr. R. B. Lyons has described the morphological changes which the different tissues undergo during the progress of putrefaction. These are but a brief statement of some of the results obtained by him and published in the *Transactions of the Royal Irish Academy*. In that he sums up his results as follows:

"In considering the chief results arrived at in the study of the process of putrefaction, I am led to believe,

"1st. That, concurrently with the first order of chemical changes, a certain order of morphic changes takes place before the final dissolution of organic structures, by the action of chemical and physical force.

"2nd. That this series of changes may, under normal conditions, take place very slowly, so that, at the end of many months, and probably even of much longer periods, we are still enabled, by the microscope, to recognize and identify structures of great delicacy, such as elementary muscular fibre, and that this knowledge admits of important application.

"3rd. That in this process of histolysis, the first changes consist in the softening, disunion, and separation from each other of the morphic constituents of the tissues, each of which is then subjected to a process of disintegration.

"4th. That granules and granular corpuscles appear at an early period, arising, probably, from recombinations of the organic fluids. Animalcules appear at this stage.

"5th. That granules, corpuscles, vesicles, cells and granular masses of various kinds and sizes, may form in fluids and tissues undergoing histolysis, in which no such elements exist when in their normal states.

"6th. That generally, in the progress of histolysis, structures very similar to those which are arranged under the first group, or the aplastic elements of histogenesis, form at different stages, and that they exhibit the same modes of growth and development, but, like them, are incapable of producing higher forms.

"7th. That these morphic elements of histolysis pass gradually into lower forms, exhibiting occasional instances of endogenous fissiparition, granular disintegration, and other changes, and that the cellular and corpuscular elements, by forming media for endosmose and imbibition, may aid in the disintegration of contiguous structures.

"8th. That certain elements may pass directly into a state of molecular disintegration.

"9th. That certain corpuscles, of peculiar characters, and not identical with any known normal elements, are occasionally found.

"10th. That a period arrives, at which chemico-physical forces prevail, which is evidenced by the passage of certain elements into crystalline forms, others passing off by volatilization, solution, &c., and that in this way the final dissolution of a tissue is accomplished, the several morphic changes which take place probably facilitating and preparing the way for the action of the chemical forces.

14.—*Development of Blood Globules.*—Moleschott has ascertained, by a series of experiments on frogs, that when the liver is extirpated, the number of white globules in the blood is increased. In the cardiac blood he found 1 white corpuscle to 2.24 colored, the natural proportion in these animals being 1 to 8. In the blood of the liver, the proportion was 1 to 5.88. In the splenic blood there were more white than red corpuscles. *Hence the liver appears to be an organ in which, to a very considerable extent, the conversion of white corpuscles into red takes place.*

When the spleen is extirpated, there is a slight increase in the

proportion of colored corpuscles. When both liver and spleen are removed the quantity of colored corpuscles is diminished to one-fourth the normal amount.

15.—*Temperature of the Blood.*—The younger Liebig has been engaged in researches upon the relative temperature of arterial and venous blood. He has found, contrary to the commonly received opinion, that venous blood is always hotter by from .07° to .19° C. than arterial.

In order to get at these results, he killed a dog, and tied a ligature tightly round the neck, to prevent collapse of the lungs. Some air remaining in the cells of these organs and the circulation still continuing for a while, the blood would be acted upon by the air, and arterial blood would always be found in the left side of the heart. The thorax was now opened, by the smallest possible aperture, the aorta tied at its bend and the descending cava close to the auricle; then the dog being raised, the vessels were drawn so as to make the opening in them the highest point. Thermometers then being passed into the two ventricles through these vessels, the opening in the thorax was filled with carded cotton, to prevent the more rapid cooling of the thinner ventricle.

The results are:

1st. *As to the difference of temperature between the two kinds of blood.* In the recently dead animal, the blood of the right ventricle was once hotter and twice equal to that of the left. In the ascending cava, the blood was 0.72° C. warmer than in the carotid. In the *living* animal the venous blood was, as we have said, constantly .07° to .19° C. warmer than the arterial.

2d. *As to the differences of temperature in the venous blood at different parts of the circulation.* The temperature of the blood, in the large vessels coming from the head and upper extremities, rises as it approaches the vena cava inferior, in which it attains the highest temperature. In the vena cava superior this increase is not very rapid, but in the auricle, where this blood is mixed with the abdominal blood, the rise is well marked. A similar rise takes place in the iliac vein. In the extremities the temperature is lower than in the trunk of the venous system. In arterial blood the variations are much smaller, and become altogether inappreciable at less than 6 centimetres from the heart.

3d. *As to the changes of temperature at one and the same level of the arterial or nervous system.* The temperature in the veins varies regularly with the respiration. In the superior cava the rise takes place at the end of inspiration, reaches its highest point in the interval, and the temperature is lowest after expiration.

Maximum. Minimum. Maximum.
Inspiration —— Expiration —— Inspiration —— Expiration.

The oscillations in regular breathing are from 0.07° to 0.19° Centigrade.

Liebig explains these phenomena in this manner: In inspiration, the pressure of the diaphragm and abdominal viscera causes an increased flow of blood from the inferior cava towards the ventricle; while in expiration the flow takes place toward the inferior cava. Now the blood of the inferior cava being warmer than that of the superior, the blood must be hottest just after inspiration.

16.—*Function of the Valves of the Heart.*—Nega has advanced some new views of this subject, founded upon vivisections and experiments on the dead heart. He thinks he has proved that the auriculo-ventricular valves are closed by the sudden contraction of the auricles, after the ventricles are partially filled. Secondly, he has seen, during his vivisections, the tense valvalar flaps drawn down by the action of the papillary muscles, which, according to Kürschner, almost disappear into the substance of the heart, during the systole. Thus, the valve acts not only as a valve to the auricular opening, but as a forcing pump to the ventricle, and a suction pump on the auricular side. The first sound, therefore, he thinks, is caused by the tension of the valves and the tendinous chords, caused by the contraction of the papillary muscles and the hydrostatic pressure of the blood.

17.—*The Phrenic Nerve.*—Luschka has published a memoir on this nerve, in which he arrives at several new conclusions.

It comes off from the cervical plexus, usually from the fourth cervical nerve exclusively, though sometimes it interchanges filaments with the neighboring nerves. In regard to this point, he admits the union with the middle or inner cervical ganglia, but denies that with the pneumo-gastric. The communication with the

descendens noni, was only observed in three cases, and then a microscopic examination showed that it was only apparent and not real. A connection, however, of common origin, exists between this nerve and the cutaneous branch of the fourth cervical nerve of the shoulder, which will account for the pain in the right shoulder accompanying hepatitis. This connection is sometimes rendered closer still by arched fibres passing from the phrenic to this same cutaneous nerve.

As it passes over the pericardium, it is occasionally diseased in certain pulmonary disturbances—tubercle, for example. Branches of it are distributed to the pleura, and therefore Luschka thinks that, in pleurodynia, blisters ought to be applied above the clavicle, so that the subsequent narcotic dressing may be applied in the neighborhood of the cutaneous ramification of the nerve.

The lower cava and the right auricle are fed by this nerve in company with the sympathetic experiments, performed on dogs and rabbits by the author, show that stimuli applied to the nerve, produced contractions in the auricle isochronous with those of the diaphragm and not with the contraction of the compartments of the heart.

The phrenic nerve also communicates very freely with the sympathetic and with its fellow of the opposite side, and sends branches to the peritoneum, the liver and supra-renal capsules. Some of the branches are directed towards the navel, which accounts for the fact that, in periteneal inflammation, the pain often begins in the region of the navel. From the reflex action of these nerves, in all probability, arises the vomiting which attends peritonitis.

The phrenic nerve, therefore, is both motor and sensory, and besides the functions already adverted to, it brings about a double interchange between the sympathetic and spinal nerves. Luschka seems to think that it is the special communication between these two great classes of nerves.

18.—*Influence of the Pneumo-Gastric Nerves in Digestion.*—Bidder & Schmidt, whose contributions to the Chemistry of Digestion we noticed at length in our last number, have also added to our knowledge of the physiological relations of this fundamental function of life. They found that:

1. Section of the pneumo-gastric nerves did not diminish the sensation of hunger, and increased that of thirst. The œsophagus

being paralyzed in its lower part, the food or saliva could not pass into the stomach and was again rejected. The absence of the usual absorption of fluid and saliva by the blood vessels, explained the thirst.

2. The motions of the stomach were not impeded. Food introduced into the fistula was forwarded in the usual way, and was not returned by the vomiting which was going on. Thus the vagus, in the neck, does not possess those fibres by which the muscular coat of the stomach is connected with the centre of its regular actions. Nevertheless, irritation of the vagus in the neck excites the action of the stomach.

3. The secretion of the gastric juice was *little diminished.* When any diminution took place, it was to be attributed to the lack of the stimulus of food in consequence of the œsophageal paralysis. By reason of the continued evacuations of the animal, the necessary water for the preparation of the gastric secretion was not to be had, so that the elimination of that fluid was considerably diminished, but it was restored again as soon as the alimentary canal was sufficiently moistened. The gastric juice formed under a general deficiency of fluid was far less acid than that furnished after a new supply of water. This, however, which in one case was observed to rise continually till the time of death, differed little from the reaction before the operation, being, on an average, neutralized by .413 per cent. of potash. Thus the *chemical constitution of the gastric fluid* is not remarkably altered by section of the vagi.

4. The *quantity of albumen digested is materially diminished* by section of the vagi, though the function is not destroyed; an effect which, it would appear, must be attributed to the alteration in the quantity of the secretion, the only known change in the action of the stomach caused by the operation.

It will be observed that these results are the very opposite of those of Bernard, who stated that, after section of the vagi in the middle of the neck, the motions of the stomach ceased, the secretion of gastric juice was instantly arrested, and in no case did any part of the food go through the peculiar changes of chymification.

19.—*Relations of Electricity to Secretion.*—Mr. Baxter, who has been engaged in experiments upon this subject, has found that when a circuit is established in a gland, while the process of secre-

tion is going on, the two fluids, the blood and the secretion are in different electric states, the former being positive, the latter negative.

During respiration the same change is observed. The arterial blood is positive, the venous negative.

20.—*Structure of Cartilage, Bone, Dentine, &c.*—Dr. Hoppe has published in *Virchow's Archiv*, the result of some investigations, which he has recently made by the aid of Papin's digester. He finds that the cells resist the action of the boiling water with such energy that he is compelled to believe them to possess non-gelatinous walls of their own, and not to be, as some have supposed, mere cavities in the tissue.

By boiling in Papin's digester, the intercellular substances of cartilage could be dissolved, and the cells were found floating free in the liquid. Elastic fibro-cartilage gave the same result, disproving Mülder's dictum that "the cells of fibro-cartilage yield chondrin on being boiled."

Bone, from which the earthy matter was removed by a dilute acid, dissolved entirely with the exception of the lacunæ and canaliculi, showing that these structures possess true non-gelatinous walls. Dentine gave analogous results, and Hoppe concludes that the tubes and fibrillæ of that structure possess walls of their own which contain no chondrin.

He arranges the tissues of the vertebrata in two classes: 1. Those which consist of cells and intercellular substance, as areolar tissue, cartilage, fibro-cartilage, bone and tooth: 2. Those which consist of cells alone, as epithelium, muscle, nervous and elastic tissues. This distinction is believed to hold chemically, anatomically and physiologically; since the first class comprises the *supports* of organs, the second, the organs themselves.

21.—*Capillaries of the Liver.*—It will be remembered that some doubt has existed in the minds of physiologists in regard to the capillaries of the liver, whether the minutest of them had a true tunic, or whether they were only channels in the proper substance of the liver. Mr. Rainey, in a communication to the *Journal of Microscopical Science*, states that he has shown them to be, like all other capillaries, possessed of a true tunic, and that they are about 1-3000

of an inch in diameter, inosculating and leaving meshes about 1-1000 of an inch in diameter. He thinks the reason this tunic is so difficult to demonstrate, is, that it is so thin and delicate, and adheres so firmly to the hepatic corpuscles, no basement membrane having been demonstrated in the liver.

EDITORIAL DEPARTMENT.

BIBLIOGRAPHICAL NOTICES.

The Use and Abuse of Alcoholic Liquors in Health and Disease. By WILLIAM B. CARPENTER, M. D., F. R. S., &c. Philadelphia. Blanchard & Lea, 1853.

THIS little book, as is very well known, is the treatise which took the prize of one hundred guineas offered for the best essay on the use of alcoholic liquors in health and disease. The great eminence of the author as a physiologist, and the unanimity with which the distinguished medical gentlemen, selected as a committee of judges, awarded the prize, bespeak for his opinions the most respectful consideration, and render it a matter of no little temerity to dissent from his conclusions.

These conclusions are, briefly, that it is safe to argue from the phenomena of a poisonous over-dose of alcohol, to those of the habitual *excessive* indulgence in it, especially as the latter have been determined by experience to be precisely what we might expect from a careful study of the former: that the moderate use of these beverages undoubtedly predisposes to disease; that they cannot increase the ability of a man to undergo bodily or mental labor; that they are generally insufficient to counteract a deficiency of power in the system to carry on the normal actions of the economy and therefore it becomes the duty of the physician to discourage the habitual use of alcoholic drinks in all persons of ordinary health, or even in those laboring under occasional depressions, and finally, that great care must be used in discriminating those cases of disease in which it is likely to prove useful.

The book is now put forth in a cheap and popular form, containing marginal notes, which explain the technical terms used in the text. We have no doubt, that among thinking men, it will prove the most powerful coadjutor to the cause of temperance that has ever been given to the public.

On the Etiology, Pathology and Treatment of Fibro-Bronchitis and Rheumatic Pneumonia. By Thomas H. Buckler, M. D. Philadelphia. Blanchard & Lea.

Dr. Buckler is well known as an acute and original thinker, a close and accurate observer, and the volume before us is not calculated to detract from his well-earned reputation.

The Doctor's object, in this little book, is to establish the fact, that rheumatic inflammation may and does attack the lungs, as well as any other organ in which fibrous tissue exists. The possibility and extreme probability of such an event seem almost too palpable to demand proof. It is difficult to conceive why a disease, which invades every other fibrous membrane in the body, should spare that only which enters into the composition of the organs of respiration.

The author cites a number of cases, and enters into a critical analysis of them. They are striking and peculiar in their phenomena, and respond in a very remarkable manner to therapeutic agents.

The subject is one of very great importance, and should direct the attention of the profession to this book, which is the only one that gives special heed to it. The author has certainly made out a very strong case.

Lectures on Surgical Pathology, delivered at the Royal College of Surgeons of England. By James Paget, F. R. S., lately Professor of Anatomy and Surgery to the College, Assistant Surgeon and Lecturer on Physiology at St. Bartholomew's Hospital. Hypertrophy, Atrophy, Repair, Inflammation, Mortification, Specific Diseases and Tumors. Philadelphia. Lindsay & Blakiston, 1853.

Such is the title of one of the most complete treatises on the subject of surgical pathology that has ever issued from the press. Many of these lectures were printed shortly after their delivery, and had a wide circulation. Those on *reproduction and repair after injuries,* were published in Rankin's Half Yearly Abstract, had a wide circulation, were much read and greatly admired.

These lectures were founded upon the pathological specimens in the museum of the Royal College of Surgeons, in London, which are designed chiefly to illustrate the principles of general surgical pathology. This volume is not a mere republication of the lectures as delivered. They have been carefully revised and many important additions have been made. The lectures on cancer especially are much fuller than they formerly were, and embody the latest information in regard to this important subject.

It is hardly necessary for us to say any thing of the manner in which these subjects are handled. Mr. Paget's merits are so well known to the

reading portion of the medical profession as to make that almost a work of supererogation on our part. He is a well-informed physiologist, and he very judiciously brings the science of the healthy body to bear upon the study of the diseased organism. His style is clear, easy and natural, never disgusting you by vulgarity on the one hand or stilted rhetoric on the other.

The work begins with a consideration of the all-important subject of nutrition, its relations of development and growth, and the conditions of the perfect performance of the function. A foundation having thus been laid in physiology, the pathology of nutrition follows naturally. The disorders of nutrition, excessive on the one hand, resulting in hypertrophy, insufficient on the other, leading to atrophy are then taken up. As a corollary to the latter we have the process of degeneration, especially the atheromatous or fatty degeneration, which has risen to such importance in modern pathology. Then follow the lectures on repair and reproduction, full of important information, exhibiting the natural and healthy reaction of the system against injury. From this the transition is easy to that reaction which passes beyond the limits of health; inflammation, with its products, the disposition the system makes of those products, and its terminations. Specific diseases are then taken up and the discussion of tumors, their classification and history, occupies nine lectures. Cancer is then carefully studied, five lectures, extending over 140 pages, being devoted to its examination. A lecture on tubercles finishes the book.

We cannot close our notice of this very valuable work, without expressing our admiration of the exceedingly handsome manner in which it has been brought out. Like most books issued by Messrs. Lindsay & Blakiston, its typographical execution is faultless. The wood-cuts are unexceptionable. It would be difficult, if not impossible, to excel them even in England, where the art of wood-engraving has been brought to so high a state of perfection.

A Treatise on the Venereal Disease. By John Hunter, F. R. S., with copious additions, by Dr. Philip Ricord, Surgeon of the Hospital du Midi, Paris, &c., edited, with notes, by Freeman J. Bumstead, M. D., Physician to the North Western Dispensary, New York. Philadelphia. Blanchard & Lea.

The first glance at this edition of John Hunter's famous treatise, reminds us very forcibly of those pieces of literary patchwork, the pests of our youth, the *variorum* editions of the classics, with innumerable and interminable annotations, a little rivulet of text meandering through a continent of notes. The notes too were such multiform things. One *eruditissimus* differs so very learnedly and lengthily from another *vir ornatissi-*

mus in regard to the quantity of vowels, and there is such a whirlwind of learned dust, and such hosts of *illustrissimi* are called in to bolster up a particular reading, and such a jangle of *optime Jonesius* and *pessimé Smithius* that you forget the subject of discussion in the warmth and prolixity of the debate, and lose sight of the author in the crowd of his annotations. The present edition was edited in France by Ricord, with numerous additions, and is now re-edited in this favored land by Dr. Bumstead. Not content, however, to re-edit after Ricord, the American goes back to two other English editions.

Shortly after Hunter's death, Sir Everard Home brought out an edition of the great physiologist's work on the venereal disease, which he embellished with annotations of his own and alterations which he professed to have derived from Hunter's manuscripts. In 1835, Mr. George C. Babington issued an edition of the second edition, published during Hunter's lifetime and under his own supervision, adding however most of Home's annotations. Dr. Bumstead uses this edition and copies its notes. Thus the attentive reader, who peruses this edition, finds himself in a wilderness of annotations, marked RICORD, ED. G. C. B., and HOME. To add to the confusion, many of the comments and alterations are introduced into the text, and then these names and initials are placed before them.

Our objections, however, are limited entirely to the *form* of the book. The contents are very valuable. They embrace the experience of several eminent men who have seen much of the disease in question. Ricord is, as is well known to our readers, generally regarded as the highest living authority in all matters pertaining to the recognition, history and treatment of this formidable and disgusting class of disorders. The other gentlemen, from their position, must necessarily have seen much of these affections, so that the reader of this edition has the advantage of the results of the observation of an unusually large number of cases.

Elements of Chemistry, for the Use of Colleges, Academies and Schools By M. N. REGNAULT, translated from the French by T. FORREST BETTON, M. D., M. A. N. S., and edited with notes by JAMES C. BOOTH and WILLIAM L. FABER. Second edition, to which is appended a comparative table of French and English Measures. In two volumes. Philadelphia. Clark & Hesser, 1853.

WORKS on Chemistry have multiplied very rapidly within the last three or four years, but the demand for them has by no means diminished. This may be accounted for in two ways. The number of students of chemistry is constantly increasing, and the science itself is rapidly advanc-

ing. The text-book which was thought a few years since to be perfectly unexceptionable in the mode of its arrangement is now found to be entirely insufficient. The science has not only advanced, but the relations of its parts have in some measure changed. This state of things may be lamented by those who do not look beneath the surface, but they might as well complain that the boy romping about the house cannot wear clothes of the same size and pattern which suited him perfectly while he was dandled upon his nurse's knee.

There has been, also, it must be confessed, a defect in most of the text-books on this important science, which very much impaired their usefulness to a large class of readers. The connection of the great results of chemistry, with the every-day duties of the manufacturer was not sufficiently elucidated. It was, as a general thing, merely glanced at by way of illustration, or rather carelessly commented on. It constituted no part of the special study of the author, but was only alluded to as a collateral fact. It is true there were works which were devoted especially to technological chemistry, but they were bulky and too prolix for any thing but books of reference. Besides this, they paid too little attention to chemical principles, so that here again, this divorce of principle from practice was kept up. A manual was needed by the general chemical student, which should supply him with both the principles of the science and the application of them to the different purposes of the arts.

This desideratum is amply supplied by the work before us. A part of the description of every substance used in the arts, consists of an account of the manner in which it is made on the large scale, illustrated by excellent sketches of the apparatus used in the manufacture. Nor is it a mere dry, barren, technological description of processes. Much care is taken to impress upon the mind of the reader the *principles* upon which the processes are based. In some instances special experiments are contrived for the express purpose of elucidating these processes.

This renders the work invaluable to that numerous class of readers who are engaged in manufactures into which chemistry enters. This method of treating the subject not only furnishes them with a history of the processes adopted elsewhere, but by expounding the chemical changes taking place at the different stages of these operations, it enables the intellgent manufacturer to improve upon these processes. In this technological department, the additions of the American editors are valuable.

The analytical department of the work is also much fuller than is customary in a treatise on formal chemistry. Processes are given for analysing nearly every compound substance described in the book, and figures of the necessary apparatus are appended.

The author has very judiciously given space for the fuller elucidation of purely chemical actions by throwing aside entirely the chemistry of the imponderables, which occupies so much space that might be better filled

in many of our text-books. The truth is, the study of these subjects belongs rather to physics than to pure chemistry, and they have become so extensive as to demand special treatises for their explanation.

Another peculiarity to which we would call special attention is the very large number of engravings (nearly 700) with which this edition is illustrated. They supply most valuable references for forms of apparatus. Nearly every modification of apparatus which the chemist requires, most manufacturing arrangements, and nearly every experiment which can in this manner be exhibited, is figured. The great value of such illustrations it is unnecessary to dwell upon.

After what we have already said, it can scarcely be necessary to add that we most heartily commend this work to all students of chemistry. It is one of the best that has ever come under our observation.

On the Treatment of Vesico-Vaginal Fistula. By J. Marion Sims, M. D. Philadelphia. Blanchard & Lea.

If ever there was an *opprobrium chirurgicorum*, it has been the disease treated of in the pamphlet before us. Surgeons generally had come at last to the conclusion to let it alone, and hand over its unfortunate victim to the misery and self-abhorrence inseparable from her disgusting complaint.

The author of this little pamphlet, however, has made the relief of these unhappy sufferers the subject of patient, earnest, judicious and successful study. Every thing that is worth any thing in the operation now performed by him is his own. All that had been done before consisted in the only occasionally successful application of the ordinary *armamentarium chirurgicum* to these particular cases. The edges of the wound had been pared and then approximated by sutures and a catheter had been introduced to keep urine from dribbling over the raw surface. There is nothing in all this of any special value.

Dr. Sims has, however, by "patient perseverance in well doing" succeeded in remodelling the operation, or rather in originating a new process. In the first place, by a very simple yet complete arrangement, he exposes the vagina to a clear strong light without inflicting pain on the patient. Secondly, he has contrived a suture which will not cut out and which retains the parts in perfect apposition. Thirdly, he has invented a self-retaining catheter, which is comfortable to the patient and perfectly excludes the urine from the fistula. That is to say, he has overcome all the difficulties and gained much experience in the management of all the details of the case, both before and after the operation.

Of the pamphlet itself it is not necessary to say much. It has been before the public since January, 1852, in the shape of an article in the American Journal of Medical Sciences, of which this is a reprint. It is a clear but modest statement of the methods by which the author proceeds in

the performance of the operation and the more difficult subsequent management of the case.

We are glad to see from a little advertisement attached to the pamphlet, that the author has recovered from a severe illness, which, at one time, bade fair to prove fatal, and that he has opened an infirmary for the treatment of this and kindred diseases, at 79 Madison avenue, New York. Long may he live to reap the fruits of his industry and to bring comfort to the afflicted.

The American Journal of Science and Arts, for November. Contents: Biography of Berzelius, by Prof. H. Rose, of Berlin; on an Isothermal Oceanic Chart, illustrating the Geographical Distribution of Marine Animals, by James D. Dana; the Coalfield of Bristol County and of Rhode Island, by President E. Hitchcock; Researches on different applications of Magnetic Attraction, by M. J. Nicklés; on the Passivity of Nickel and Cobalt, by M. J. Nicklés; Method of taking Daguerreotype Pictures for the Stereoscope, simultaneously, upon the same plate, with an ordinary camera, by Prof. F. A. P. Bernard; Theoretic Determination of the Expenditure of Heat in the Hot Air Engine, (supplementary article,) by Prof. Frederick A. P. Barnard; on the Consolidation of Coral Formations, by James D. Dana; Re-examination of American Minerals, by J. Lawrence Smith and George J. Brush, Ph. B.; Various actions of Nitric and Oxalic Acids on Salts of Potassium and Sodium, and on Zinc, by J. Lawrence Smith; on the Blood-Corpuscle-holding Cells, and their relation to the Spleen, by W. J. Burnett, M. D.; Extraordinary Fishes from California, constituting a new family, described by L. Agassiz; on a change of Ocean Temperature that would attend a change in the level of the African and South American Continents, by James D. Dana; Reviews and Records in Anatomy and Physiology, by Waldo G. Burnett; Correspondence of M. J. Nicklés; Scientific Intelligence.

In the latter article we find an account of the application of the vapors of ether and chloroform to the steam engine. The experiments were tried in France, and resulted in a very large saving of fuel. The principle consists in making the exhaust steam vaporize the lighter liquid, which vapor is used in the cylinder, thus saving the heat otherwise lost in the transition of steam to water. The saving of fuel amounted to fully 75 per cent. This is a very remarkable result and one which no doubt will encourage further experiment.

Prof. Agassiz's account of the California fishes, like every thing that comes from his pen, is extremely interesting and instructive. Their mode of reproduction is very remarkable, their *gestation being ovarian,* the first instance we believe of this sort of gestation in the *normal* condition.

Ellis' Medical Formulary. Tenth edition, revised, and much extended by ROBERT P. THOMAS, M. D., Professor of Materia Medica in the Philadelphia College of Pharmacy. Philadelphia. Blanchard & Lea, 1854.

ELLIS' Formulary has been so long before the profession that it would be a work of supererogation to comment upon it. Every where it has been recognized as a very valuable addition to the library of the physician and of the pharmaceutist.

The present edition is in many respects an improvement upon its predecessors. Complicated formulæ have been simplified. New prescriptions have been added, especially such as contain the new remedies. The formulæ for external application have a book to themselves. The tables of dose, have not only been revised but rewritten. And lastly, all obscurity has been removed by the revision of the old prescriptions, and the alteration of their nomenclature to correspond with that adopted in the United States Pharmacopœia.

The book, as it stands, is one that should lie on every physician's office-table and every druggist's counter. It contains more useful, available, practical information than any work of the size of which we have any knowledge.

Handbook of Chemistry, Theoretical, Practical and Technical. By F. A. ABEL, Professor of Chemistry at the Royal Military Academy, Woolwich, and Assistant Teacher of Chemistry at St. Bartholomew's Hospital; and C. L. BLOXAM, formerly first Assistant to the Royal College of Chemistry. London. John Churchill, Prince's street, Soho, 1854.

THIS book is constructed upon a plan somewhat new. The first part is devoted to a consideration of those portions of physics which must be understood by the practical chemist. Then comes a very satisfactory description of the various chemical manipulations, sufficient to constitute a safe guide to the student who desires to acquaint himself with the various manual operations of the laboratory. Elementary chemistry is next taken up, and treated concisely but clearly, and lastly the authors give an excellent synopsis of analytical chemistry.

The account of the chemical manipulations is quite full, and technology has received a due share of attention. Processes are given for the convenient and rapid analysis of the chemicals produced on a large scale. The plan adopted, in the sections on analysis, of giving examples for practice, is very well, as far as it goes, but should, we think, have been preceded by a fuller account of general analysis.

However, as the book stands, it will be found a very valuable manual for the chemical student.

Second Report on Quarantine, Yellow Fever, with Appendices. Presented to both Houses of Parliament by command of her Majesty. London: Printed by W. Clowes & Son, for her Majesty's Stationary Office, 1852.

THIS is an elaborate report upon yellow fever, in which the epidemics at Gibraltar, Boa Vista, Martinique, Cadiz, &c., are examined with much care and attention. The authors of the report come to the conclusion that there is no ground for the belief in the contagious character of this scourge of the tropics, and that the evidence of its importation is, in all cases, entirely insufficient.

In this conclusion they are at issue with the British and Foreign Medico-Chirurgical Review. In the number for October, 1852, there is an able review of this very report, in which directly opposite conclusions are arrived at, from the consideration of the same epidemics.

Introductory Lecture to the Course for 1853 *and* '4, *in the Medical Institution of Yale College.* By JONATHAN KNIGHT, M. D.

THIS introductory is chiefly taken up with a sketch of the history of the medical school attached to Yale College. It states the very remarkable fact, to which we know no parallel, that out of the *four* professors originally appointed *forty years ago,* three are still living and retain their professorships.

Another peculiarity about this school, which we should be very happy to see other medical colleges adopt, is the independence of the board of examiners of the fees and their influence. At the time the college was chartered, the State society was unwilling to part with the privilege it had hitherto exclusively enjoyed of confirming degrees upon all candidates for a diploma. A compromise was accordingly agreed upon by which the faculty yielded the casting vote in any case to the society, the examining board being composed of both organizations. The benefits of this arrangement, especially the greater security to the community from the murderous blunders of unqualified practitioners, are too manifest to be more than alluded to.

Such a feature in the constitution will do much to secure a higher and more honorable state of feeling in the professors of medical schools. The contemptible huckstering for students which so disgusts every man of tolerable decency, the deliberate violation of charter-provisions will be avoided. A set of professors, acting under the direct supervision of a board of respectable medical men, unconnected with the college and uninfluenced by the paltry consideration of the fees, would hardly dare to be

guilty of the shameful act of selling the tickets for a back course of lectures which a student never attended, in order to put a young man, who has not complied with the requisitions of the charter, on a par with those who have; to admit to examination persons who, they know perfectly well, according to their own standards, are unqualified for graduation; thus violating their own laws, flying in the face of the regulations of the National Medical Convention, and deliberately lowering the already depressed standard of requirements, for the petty bribe of fifteen dollars in hand paid to each professor. In spite of any virtuous indignation which may be gotten up in consequence of such an insinuation, we must persist in believing that

—"Mankind are unco' weak
And little to be trusted
If self the wavering balance shake,
'Tis rarely right adjusted;"

especially since we *know* that this thing has been done, and *is* done, and *will* be done, till the watchfulness of the profession prevents it, by schools, the alumni and professors of which would be terribly shocked, should any profane wretch express a doubt of their respectability. We can, if necessary, cite date, place and witnesses for what we assert.

Principles of Organic and Physiological Chemistry. By Dr. Carl Löwig, Doctor of Medicine and Philosophy, Ordinary Professor of Chemistry in the University of Zurich, Author of Chemie der Organischen Verbindungen. Translated by Daniel Breed, M. D., of the U. S. Patent Office, late of the Laboratories of Liebig and Löwig. Philadelphia, A. Hart, *late* Carey & Hart.

This book, having been reviewed in the original department of this number of the Journal, needs no further notice in this place.

MISCELLANEOUS NOTICES.

Dr. F. H. Badger.—We have recently had the pleasure of making the acquaintance of Dr. F. H. Badger, of New Orleans, who for thirty years has sustained a justly deserved high reputation as a dental practitioner. In the operation of filling teeth, to which he has more particularly devoted his attention, he ranks among the first dentists in the union, and, during his visit to Baltimore, which was protracted to four or five weeks, we had

frequent opportunities of interchanging views with him upon various subjects connected with operative dentistry. Thus, our personal intercourse with Dr. B. was not only a source of great pleasure, but we obtained from him some valuable practical suggestions which our own experience and the other sources of information of which we had hitherto been able to avail ourselves, had failed to supply. Among other things, he described his method of procedure in filling roots of teeth, and as this is an operation which is attracting considerable attention at this time, we will endeavor to repeat it.

The pulp of the tooth, if remaining, is first destroyed with arsenious acid and creosote, applied on the inside of a small cap made of sheet lead, with a small perforation in the centre, through which the sharp end of a small wire projecting from the end of a canula or tube is passed, and by means of which, it is placed directly upon the exposed pulp. The tube is now moved on the wire until the end comes in contact with the convex part of the cap, when the stylet or wire is withdrawn and both removed without displacing or moving from its proper adjustment the leaden cap. This done, the external opening in the crown of the tooth is filled in the usual way with softened wax, and the application permitted to remain sufficiently long to destroy the vitality of the entire pulp.

The wax and cap containing the arsenious acid, having been taken from the tooth and the pulp removed to the extremity of the root, the external opening, if necessary, is now enlarged and the central chamber in the tooth made as easy of access as possible. In short, the tooth being properly prepared for the reception of the filling, a piece of gold foil, of about two inches in length, and a quarter or a half inch in width at one end and coming to a point at the other, is rolled into as a solid wire as possible. The length of the canal in the root is now ascertained, and if the opening at its extremity is large enough to permit the passage of the point of the wire, the latter is clipped off with a pair of scissors. Several of these sharp cylinders or wires made of foil in the manner as just described, should be prepared previously to commencing the operation of filling, and being thus provided with them, the canal in the root is made dry, by introducing a slender pointed probe made of whalebone, silver or untempered steel, having a few straight fibres of raw cotton wound around it. When the moisture has been completely absorbed, the large end of one of the cylinders is grasped with a pair of properly shaped tweezers. With this instrument the small end is introduced into the canal of the root, and is readily carried up to the extremity of the root. This done, a slim probe, tapering to a point, made of whalebone, or untempered steel, is forced up between the gold and the wall of one side of the canal of the root, firmly compressing the cylinder. The probe is then withdrawn and another and another cylinder introduced, each one in like manner compressed, the canal in the root becoming shorter and shorter, until it is completely filled.

Having filled the root, the remainder of the operation is divided into two parts. The first, consists in filling the central chamber in the crown, and the second and last, in filling the external opening.

A Lower Molar Tooth with four Roots.—The senior editor received a letter a few weeks since, enclosing a lower molar with four well developed roots. He has mislaid the letter, and is consequently unable to mention the name of the writer. We would be glad to hear from him again.

Crystallized Gold.—Dr. Watts, of Utica, New York, presented to the senior editor, a few weeks since, some beautiful samples of crystallized gold, of his own preparation. He at the same time showed him a ring which he wore on his finger, made from it by Dr. Dwinelle, of Cazenovia, N. Y. It had the appearance of having been formed from a solid piece of metal, it being free from cracks or flaws. The senior editor has filled several teeth with Dr. Watts' preparation of gold, and certainly it realizes his most sanguine expectations. It may be made as solid and as impermeable to the fluids of the mouth as a filling of the best foil, since the crystals when brought in contact with each other by pressure, weld and become a solid mass. It answers in many cases where the tooth is broken away, rendering it necessary to build the gold up above the walls of the cavity a much better purpose. Still it can never be made to supersede the use of gold foil. This can be introduced in most cases with greater facility, and in some cases where it would be impossible to make a good filling with crystallized gold, unless some better method than any at present known, of introducing it, shall be discovered. But so important and valuable does he regard this preparation of gold, that he would not, on any account, dispense, wholly, with the use of it in his practice.

Such of the readers of the Journal as may desire to give Dr. Watts' preparation of gold a trial, will ascertain where it may be procured by referring to his advertisement in the advertising sheet of the present number.

Cholera.—A very remarkable statement has been recently made in a communication from Dr. Bury, read to the Medical Society of London. It is to the effect that metallic copper externally applied, in the form of a band, actually arrested the cramps. The communication goes on to say that its author had discovered, from an investigation of about 300,000 cases, that workmen in copper and in steel enjoyed a remarkable exemption from this terrible scourge. The author even pushes his assertion so far as to declare that *removal to a copper mine* had checked choleraic symptoms. The latter statement borders so closely on the marvellous that we may be excused for asking for ample proof before we believe it.

Mustaches.—Punch has lately been making himself merry over what he calls the moustachio movement. He pictures terrible looking fellows "bearded like the pard" haunting the railway stations, demanding baggage, and terrifying old ladies who fancy they are beset by banditti.

On the other hand, some medical men are advocating the return to the natural use of the beard, thinking probably that the Almighty knew quite as well as we do where it is best that hair should grow. The hint is thrown out that consumptive patients may be benefitted by the use of mustaches. The Scottish stone-masons have allowed their beards to grow upon their upper lips, so as to obtain a filter which arrests the dust before it can penetrate the lungs. There can be no doubt that a good bushy beard will act in this manner, and so save the air passages no inconsiderable irritation.

Meanwhile it is surprising what a tremendous prejudice exists in some minds against this simple obedience to the dictates of nature. There are still sections of our country in which a man would be ruined who should undertake to turn out a pair of mustaches. We once heard a very worthy but weak old gentleman furiously denouncing certain young men, of whom he knew nothing except that they suffered all their hair to grow. He regarded their mustaches as incontestable evidence of atheistical sentiments.

For ourselves we are obliged to divide the luxury among us, so that our three conjoint faces would present the original distribution of hair, before razors interfered with the plan of nature.

Artificial Diamonds.—It will be remembered by our readers who have watched the progress of chemistry for the last thirty years, that much interest was awakened and much discussion excited by the attempt, some years ago, to crystallize carbon by the galvanic battery, or, in other words, to produce diamonds by artificial means. We remember to have seen the venerable Professor Silliman exhibit to his class certain brilliant little particles which had been obtained in this way, from charcoal. Much was said about these at the time, one party contending that they were genuine diamonds, the other that they were only particles of fused silex, originating in the inorganic matter of the coal.

This old discussion bids fair to be revived. We see that M. Despretz has claimed to have effected this modification of carbon by his galvanic battery, under circumstances which do not admit of the hypothesis of fused silex. He placed at the inferior pole of a voltaic battery a cylinder of charcoal, the purity of which was ensured by preparing it from crystallized white sugar candy, and at the superior pole a bundle of fine platinum wires. These elements were so arranged that when the electric light

was formed, the charcoal was in the red and the platinum in the violet portion of the arc. After the action was over, he found the carbon collected in a changed form upon the platinum wires. The current was continued for a month, and the powder was found hard enough to polish rubies with great rapidity. When burned it left no residue whatever.

M. Despretz remarks as follows upon these phenomena:

"Have I obtained crystals of carbon which I can separate and weigh, in which I can determine the index of refraction and the angle of polarization without doubt? No; I have simply produced by the electric arc, and by weak voltaic currents, carbon crystallized in black octahedra, in colorless and translucent octahedra, in planes also colorless and translucent, which possess the hardness of the powder of the diamond."

A similar result has been obtained by decomposing a mixture of chloride of carbon and alcohol by weak galvanic currents. The black powder deposited was found to possess equal hardness with that which was sublimed, and rubies was readily polished by it.

Clerical Gullibility.—We wonder if there ever was a humbug too transparent, a quackery too contemptible, a dogma too monstrous, to fail in obtaining clerical support. Sherman's lozenges, Jayne's expectorant, Swaim's panacea, Delaney's Indian vegetable blood purifier, homeopathy, hydropathy, Thompsonianism, kinesipathy, physopathy, every thing monstrous, incredible, preposterous and nonsensical isc arefully cherished by some one or other of this white-cravated mob.

It is to no purpose that the medical profession with a liberality that, we are proud to say, is inseparable from the art, attends these gentlemen gratuitously, and showers upon them profusely all the benefits of the hoarded knowledge of centuries. Any shoemaker fresh from the last, ignorant to the last degree, scarcely a perceptible remove from the chimpanzee, can win the parson's confidence and secure his influence. It is disgusting to see these gullible gentry, who know less about the interior of the human body than they do of the geology of the north pole, running about among the mangy members of their flocks, shaking their confidence in their regular medical advisers, and recommending as infallible panaceas, the pills of brother Snob, or the tar-water of sister Snooks. Such a nuisance as this ought to be abated as speedily as possible.

If only some professorship could be established from which these fathers in Israel could be taught the profundity of their own ignorance in all matters pertaining to the physical welfare of their flocks, and the moral obliquity of their conduct in fostering the miserable, murderous, long-eared army of quacks, who eat up the substance and steal the lives of the people, an incalculable benefit would be conferred upon society. Or if it were required of every clergyman that he should get a general idea of medicine,

or conscientiously refrain from meddling with what he does not and cannot by any possibility understand, much money and many lives would be saved.

We wish to be distinctly understood. We do not make these charges against the clergy in the main, but only against a portion of them, ignorant, presuming, pretending grannies, who are always meddling in things which do not concern them, and in which their ignorance is like space, infinite, unfathomable. We speak, because we have seen our brethren in the profession suffer from these pretenders and we aim our shafts at them, the patrons of cancer-doctors, and water-doctors, and quack-doctors, the self-constituted keepers of more asses than Abraham ever owned. Many of the clergy, perhaps a majority of them, are too honest and too well informed to encourage quackery in any shape, but it must be confessed that the name of the class we denounce is legion.

The influence of these people being great, the mischief they do is equally extensive. They have, on account of their position, a reputation for intelligence which they do not deserve. Their opinions upon physical science are considered oracular by their followers, and yet on this matter they are, as we have already said, unspeakably ignorant. Any of our readers who has ever heard them promulgate their crude notions about mesmerism, biology, electricity, &c. will bear us out in this assertion.

These remarks have been called out by a parsonic effusion on table-turning, copied into the Dublin Medical Press. The individual who has thus kindly condescended to enlighten the ignorance of a benighted world is, it appears a vicar.

The reverend gentleman was in a party of several gentlemen and ladies, who instituted the common series of scientific experiments upon a table. He is as particular in his accounts of the movements of the table, as a military writer in his description of the evolutions of troops before some decisive battle. He tells how the table lifted up one leg, how it tapped three times on the floor, how it told him what o'clock it was, and what were the ages of the different persons in the room, with a variety of such useful information, which could have been obtained with far less trouble in another way. It is a little amusing to notice the apologies of the reverend gentleman for some of the undeniable mistakes of the table. It sometimes missed the correct age of members of the party, then the vicar gravely tells it was owing to some confusion in the minds of those who catechised the furniture.

This wonderful performance was wound up by a hornpipe from the table. This is not so unparalleled. The same phenomena has repeatedly occurred to several of our friends, after a protracted dinner-party.

Truly spake the old dramatist,

> "Hood an ass with reverend purple,
> And he shall pass for a Cathedral doctor."

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ORIGINAL COMMUNICATIONS.

ARTICLE I.

Chemistry of the Metals—Platinum. By Professor REGINALD N. WRIGHT, A. M., M. D.

(Continued from page 191.)

Oxyds of Platinum.—It is probable that only two real oxyds of this metal exist, since all our experiments only determine the *positive* existence of two. A hypothetical existence is, however, allowed to four, viz. *suboxyd, protoxyd, sesquioxyd and peroxyd.* Its affinity for *oxygen,* whether it is exposed to the air or to the action of perfectly pure gas, is so trifling, that we may safely say that they have no disposition to unite under *ordinary circumstances.*

If a powerful electric discharge is passed through platinum—in the shape of fine wire or leaf—a dark colored powder is produced, which used to be considered an oxyd of the metal, but

it is very questionable, whether or not, it is the metal in a state of minute division.

Suboxyd of Platinum may be formed by exposing perchloride of the metal in aqueous solution, to the action of *nitrate of mercury*, also in solution, the result being a pulverulent mass, having a dark color, which, upon the application of heat, gives off the mild chloride of mercury (calomel) leaving behind a black mass, generally regarded as an oxyd.

Protoxyde of Platinum.—To produce this substance, take a solution of oxyd of potassium (caustic potassa) and heat in connection with it, *protochloride of platinum;* a black oxyd is formed, which is only in part thrown down, a portion being absorbed by the alkali used, but which may be precipitated admirably by means of sulphuric acid, which has been diluted. Reduction may now be accomplished by means of heat, attended with the escape of aqueous vapors and some oxygen gas. The addition of acids will accomplish slow solution, and we have, as the result, metal, and a higher state of oxydation.

The following account of the *sesquioxyd and peroxyd*, is copied from *Brande:*

Sesquioxyd of Platinum.—"When sulphate of platinum is decomposed by ammonia, and the precipitate boiled in a weak solution of potassa, and cautiously dried, it constitutes *fulminating platinum;* when this is digested in nitric acid, a gray powder remains, composed of 100 platinum, 11-86 oxygen. (*E. Davy*, *Phil. Trans.*, 1820.) When spongy platinum is heated to redness in an open vessel with caustic potassa, and the product, when cold, washed with water, a gray powder is obtained, which is partly dissolved by the alkali; the residue, washed with dilute nitric acid, and afterwards with water, is also supposed to be sesquioxyd of platinum, consisting of

				E. Davy.
Platinum, ...	1	99	89-2	89-5
Oxygen, ...	$1\frac{1}{2}$	12	10-8	10-5
Sesquioxyd of platinum,	1	111	100-0	100-0

Peroxyd of Platinum.—When sulphuret of platinum is di-

gested in nitric acid, and carefully evaporated; or when perchloride of platinum is gently heated in sulphuric acid, a dark brown solution of *persulphate of platinum* is obtained; if this solution be mixed with nitrate of baryta, sulphate of baryta is thrown down and pernitrate of platinum remains dissolved; this may be in part decomposed by solution of caustic soda, which forms a yellow precipitate, becoming brown when carefully washed and dried, and which is *hydrated peroxyd.* Heated in a retort, it first gives out water, and becomes black; at a higher temperature it evolves oxygen, and the metal is reduced; it leaves a very feeble attraction for the acids, but readily combines with many of the salifiable bases; it dissolves in the caustic and carbonated alkalies, and may be combined with lime, strontia and baryta, by adding these earths to its acid solution, when it falls in union with them, in the form of a yellow powder. (Berzelius.) It forms a fulminating ammoniacal compound, similar to fulminating gold. This oxyd consists of"

				Berzelius.	Chenevix.
Platinum,	1	99	86	85-87	87
Oxygen,	2	16	14	14-13	13
	1	115	100	100-00	100

The next compound I would introduce, is that of the metal and sulphur, known as

Sulphuret of Platinum.—There are two of these spoken of, viz. *proto* and *bi*sulphuret of platinum—the first, (*proto-sulphuret,*) is conveniently made by exposing the two substances (sulphur and platinum) to the action of heat, in a glass tube which has been subjected to exhaustion. When the process is finished, we have a gray, pulverulent mass, which is not acted upon by the strongest acids, and which consists of one atom of platinum and one of sulphur.

Bisulphuret of Platinum.—With regard to this substance, Brande has the following paragraph:

"When a solution of perchloride of platinum is mixed with sulphuret of ammonia, or potassium, a black powder falls, which, when dried in vacuo, over sulphuric acid, contains, according to

Berzelius, no water. When this precipitate is exposed upon paper to dry in the air, the sulphur absorbs oxygen and becomes sulphuric acid, which chars the paper. When sulphureted hydrogen is passed through a solution of bichloride of platinum, the precipitate which falls, consists of chloride and sulphuret of platinum.

The bisulphuret consists of

Platinum, ...	1	99	75-5	77	75-25
Sulphur, ...	2	32	24-5	23	24-75
Bisulphuret of platinum,	1	131	100-0	100	100-00

Proto-Chloride of Platinum.—The best method of preparing this substance, is to subject the perchloride of platinum to heat until chlorine gas no longer comes over. The resultant product is a pulverulent mass, having a gray color, and which is insoluble in the strong mineral acids and water at 60° F., though boiling hydrochloric acid will dissolve it. Red heat will decompose it, and chlorine gas will be evolved; it is also decomposed by potassa, with the elimination of the protoxyd. The constitution of this substance is, chlorine 1 + platinum 1.

"When alcohol is gradually added to a hot concentrated solution of proto-chloride of platinum, in liquid potassa, effervescence ensues from the escape of carbonic acid, and a black powder falls, which, boiled successively with small portions of alcohol, then with hydrochloric acid, and then with potassa, and lastly with repeated portions of water, is Liebig's 'platinum black;' it must be separated by decantation and dried in a porcelain capsule to avoid contact of organic matter. It is metallic platinum in a state of fine comminution; it may be heated to redness without change of appearance, but at a white heat it assumes metallic lustre; it becomes incandescent, when moistened with alcohol, oxygen is absorbed and acetic acid formed; it immediately inflames a current of hydrogen in the contact of air; it absorbs about 750 times its volume of hydrogen, and also absorbs and retains other gaseous bodies. When excess of ammonia is added to the hydrochloric solution of protochloride of platinum, and the mixture boiled, it becomes turbid,

and deposits deep green acicular crystals, insoluble in water and in hydrochloric acid, which consist of 1 atom of proto-chloride of platinum, and 1 of ammonia. This salt is not affected by boiling caustic alkalies, nor by boiling sulphuric or hydrochloric acid; so that as Gros observes, it is difficult to admit that it contains 'ammonia in the state of ammonia.' When it is digested in hot nitric acid it is converted into a white granular crystalline powder, easily soluble in water, and half the platinum of the green salt is at the same time separated in the metallic state. Neither the chlorine nor the platinum of this nitric salt can be detected by the usual tests; its elements are, 1 atom of proto-chloride of platinum, 2 of ammonia, 1 of oxygen and 1 of nitric acid, so that its ultimate elements are (pla. + c + 3 n + 6 o + 6 h.) When a hot saturated solution of this nitric salt is mixed with sulphate of soda, the nitric acid is displaced by the sulphuric, and a corresponding sulphate obtained; and a hydrochlorate, phosphate, oxalate, &c., may be similarly obtained by double decomposition. These salts are represented by Gros as containing a compound base, which he compares to ammonium represented by (pla. + c + 2 n + 3 h) = B. The *nitrate* will then be (b + o + n′,) the sulphate (b + o + s′,) and the hydrochlorate (b + c,) &c." Vide Brande, p. 990.

Perchloride of Platinum.—An excellent method for the preparation of this substance is the following: Take a well made solution of the metal in nitro-muriatic acid and evaporate; after a while, the solution will assume a dark color, inclining to brownish red; very soon crystals will begin to make their appearance, and continued evaporation will result in the formation of a crystalline mass. We have now produced a substance, which is very soluble in alcohol and ether, and sparingly in water—it is the *perchloride of platinum.* The salt in question is an excellent means of ascertaining the presence of potassa; one precaution, however, being necessary to be observed in the experiment, viz. that if ammonia be present, it must be expelled by heat. The resultant, if potassa be present, is a triple salt, which will not be taken up by alcohol, and of course, will

be deposited in the bottom of the vessel; if, however, potassa be not present, the solution will not even be rendered turbid.

We come next in order to describe some of the singular compounds known—*Platino-chlorides*—for the following account of which we are indebted to Brande:

"*Platino-Chlorides.*"—"Both the chlorides of platinum enter into definite combination with the chlorides of the alkaline bases, and form *platino proto-chlorides* and *platino perchlorides.*"

Platino Proto-Chloride of Ammonia.—(Pla. + c) + (A + h cl) is obtained by adding an equivalent of sal ammonia to 1 of proto-chloride of platinum, dissolved in hydrochloric acid, it forms deep red crystals."

"*Platino Proto-Chloride of Potassium.*—(pla + po + 2 c.) This salt was obtained by Magnus, in the form of red, anhydrous, four-sided prisms, insoluble in alcohol, by evaporating a solution of proto-chloride of platinum, and chloride of potassium, in hydrochloric acid. It consists of"

Platinum,	1	99	46.9	or	Proto-chloride of platinum,	1	135	63.9
Potassium,	1	40	19.0		Chloride of potassium,	1	76	36.1
Chlorine,	2	72	34.1					
	1	211	100.0			1	211	100.0

"*Platino Proto-Chloride of Sodium.*—Similarly obtained, is not crystallizable, and very soluble in alcohol." "Platino-bichloride of ammonia. Ammonio-muriate of platinum." (Pla. + 2 c) + (A + h cl.) This is the well known yellow powder, which falls, when solutions of perchloride of platinum and sal ammoniac are mixed. When it is exposed to heat, it loses a little water, and a compound of sal ammoniac and proto-chloride of platinum is at first formed; the ammonia is ultimately decomposed, and the platinum remains, in the peculiarly spongy state before referred to. This *ammonio-chloride* is very sparingly soluble in pure water; rather more so in water acidulated by hydrochloric acid; insoluble in alcohol. If the solution from which it is precipitated contain *irridium* or *palladium*, it

has a tawny-red color; these may be removed by boiling in dilute nitric acid, and filtering the red solution, whilst hot; as it cools, it deposits a red crystalline powder, which is generally a triple salt of *irridium*, and, from which, the acid may be poured off for use as before. This double chloride, when carefully dried, contains between 44 and 45 per cent. of platinum; it is composed of"

Platinum,	1	99	43-2	Bichloride of platinum,	1	171	75-9
Chlorine,	2	72	32-4				
Ammonia,	1	17	7-7	Hydro-chlorate of ammonia,	1	54	24-1
Hydro-chloric acid,	1	37	16-7				
Platino-bichloride of ammonia,	1	225	100-0		1	225	100-0

"*Platino-Bichloride of Potassium.*—(Pla. + 2 c) + (po + c).—This salt is thrown down in the form of a yellow powder, when solutions of chloride of potassium and of bichloride of platinum are mixed; it is very sparingly soluble in water, and is deposited from its boiling solution in small octohedral crystals; it is insoluble in alcohol; when heated, it evolves chlorine, and leaves a mixture of metallic platinum and chloride of potassium. Its difficult solubility, renders bichloride of platinum, as already stated, a useful test of the presence of the salts of potassa. It is anhydrous, and contains"

Bichloride of platinum,	1	171	69-5
Chloride of potassium,	1	76	30-5
Platino-bichloride of potassium,	1	247	100-0

"*Platino-Bichloride of Sodium.*—(Pla + 2 c)+(so + c.)—Chloride of sodium occasions no precipitate with bichloride of platinum, but the mixed solutions yield on evaporation prismatic or tabular crystals, of a deep orange color, soluble in water and alcohol, and which, when heated, lose 19-25 per cent. of water of crystallization, and leave the anhydrous double salt; the crystals, therefore, contain"

Bichloride of platinum, . .	1	171	60-0.
Chloride of sodium, . .	1	60	20-8.
Water, ...	6	54	19-2.
Crystals of platino-bichloride of sodium,	1	285	100-0.

"*Platino-Bichloride of Barium.*—When baryta-water is gradually added to a solution of bichloride of platinum, a precipitate falls, composed of baryta and peroxyd of platinum, (platinate of baryta.) The solution contains excess of baryta, which falls in the shape of carbonate by exposure to air, and afterwards small crystals of the double salt are deposited. This salt may also be formed by mixing the two chlorides in atomic proportions: the crystals are orange-colored, and in form and appearance, resemble those of chromate of lead. They consist of

Bichloride of platinum, . .	1	171	54-56.
Chloride of barium, . .	1	105	33-75.
Water, ...	4	36	11-69.
Crystals of platino-chloride of barium,	1	312	100-00."

"Platino-chloride of *calcium* and *strontium* have been described by Bonsdorff, as also those of *magnesium*, *manganese*, *iron*, *zinc*, *cadmium*, *copper*, *nickel* and *cobalt;* the crystals of the last eight, are *isomorphous*, and consist of 1 atom of the bichloride of platinum, 1 atom of the basic chloride, and 6 atoms of water."

"Platino-chloride of silver, is thrown down as a yellow basic salt, when solutions of bichloride of platinum and nitrate of silver are mixed; the residuary liquid remains colorless: boiling hydrochloric acid, abstracts the chloride of platinum, and leaves the chloride of silver, nearly colorless." (Vanquelin.)

Phosphuret of Platinum.—For the preparation of this compound, it is necessary to expose the metal to the action of heat, in union with clear phosphorus, (the clippings of the metal are most economical,) when we have as a resultant—*phosphuret of platinum*, the properties of which are but imperfectly known; it consists of platinum 1—phosphorus 1.

Perphosphuret of Platinum, is made by a process similar to the above, using *ammonia chloride of platinum* instead of the metal, and applying heat. Its exact constitution is uncertain.

Ferro-cyanuret of Platinum.—To obtain this substance, an excellent method is to take the spongy platinum, 1 part—and ferro-cyanuret of potassium, 1 part—and expose them to a heat

below redness; decomposition takes place, attended with the elimination of iron, which comes from the cyanogen. Having progressed thus far, dissolve the product in water, and then by careful management, crystals may be obtained, which are bicolored if viewed in different positions, changing from blue to yellow. The salt is rather insoluble in cold water, but will dissolve with some freedom in water at 212° F., it cannot, however, be preserved in this menstruum, unless the temperature be kept up; as the solution cools, crystals will be deposited, but we have not yet obtained absolutely positive results.

Sulphate of Platinum.—To obtain this salt, first make a solution of the oxyd of platinum in potassa, and add to it sulphuric acid; a precipitate is formed, which, when the liquid is decanted, may be dissolved in sulphuric acid which has been well diluted: evaporate now, and the result is very dark colored, becoming red on the addition of water. From the solution of sulphate of platinum, caustic potash will throw down the oxyd of the metal. *Persulphate of platinum*, considered an excellent test for gelatine, is obtained by adding nitric acid, to the sulphurets.

Nitrate of Platinum, is formed by adding nitric acid to the protoxide of platinum, and the pernitrate is formed by adding the same acid to the peroxyd.

The following account of "fulminating platinum and the characters of the salts of platinum," is from Brande.

"*Fulminating Platinum.*—E. Davy says, that the precipitate from solution of sulphate of platinum by a slight excess of ammonia, when boiled in potassa—washed and dried, was a *fulminating platinum:* it explodes at 420° with a loud report, and appears to be a compound of oxyd of platinum, ammonia and water. (Phil. Trans., 1817.) He has also described a compound of platinum, (Phil. Trans., 1820, p. 108,) obtained by mixing equal volumes of strong aqueous solution of the sulphate and of alcohol. The color of the sulphate slowly disappears, and in some days, a black substance subsides, which is washed and dried. It is also formed by boiling the sulphate and alcohol together for a few minutes. This substance is permanent in

the air, and insoluble in water. It detonates feebly when heated, and is not affected by chlorine, nor by nitric, sulphuric or phosphoric acids; but it is slowly soluble in hydrochloric acid. Put into liquid ammonia, it acquires fulminating properties; and plunged into ammoniacal gas, it becomes red-hot: the same phenomenon is exhibited by exposing it to the vapor of alcohol, or by placing it upon a piece of paper moistened with that fluid: in these cases, the platinum is reduced, with the evolution of heat, and the ignition seems to depend upon the slow combustion of the vapor of the alcohol. Some of these properties correspond with those of *platinum black.*"

Characters of the Salts of Platinum.—The difficult solubility of the ammonio and potassio-chlorides of platinum, and the solubility of the soda-compounds, are very characteristic of this metal. Phosphate of soda, produces no precipitate in chloride of platinum; the ferro-cyanuret of potassium, throws down the platino-chloride of potassium: cyanuret of mercury occasions no precipitate: iodide of potassium communicates a reddish-brown color, to solutions of the chlorides of platinum, and gradually produces a brown precipitate; and if the mixture be heated in a matrass, the glass acquires a coating of metallic platinum, but its complete separation in the metallic state is slow; iron, zinc, cadmium and copper, are its most effective precipitants; they separate it as a black powder, which sometimes adheres in fibres to the glass."

The subject of the next article will be Mercury.

[To be continued.]

ARTICLE II.

Sponge Gold. By W. H. DWINELLE, M. D., D. D. S.

To produce a gold stopping of the highest excellence with foil, two things at least, are absolutely necessary. First, the possession of a material that shall combine the qualities of tough-

ness, adhesiveness and purity. Second, the best instruments, in the hands of the most skillful experience.

But however excellent the appliances, well adapted the instruments, or ingenious the hand that guides them, they are all valueless and fail to accomplish the end, if the gold does not combine the qualities above indicated.

To insure with uniformity the characteristics of adhesiveness and toughness, it is absolutely essential that the gold should first be made *pure.*

For the present it is sufficient to remark, that much of the gold prepared for our profession is rendered "chemically pure" by *quartation*, and consequently cannot always be pure, for the reason that gold often contains foreign metals not soluble in acids. In addition to this, gold is often alloyed before it is beaten into foil.

Indicative of this fact, and as a universal test of the quality of gold, whether in the form of foil or otherwise, it is only necessary to consider that *pure gold is of a uniform color throughout the world.* A comparison of Abbey's foil, and some few others, with the paler foils of the market, will render it easy to distinguish between gold which is absolutely pure, and that which is not.

At some future time we will endeavor to give in the Journal, the process by which gold may be obtained in *all cases*, entirely pure. But to our purpose.

Although we must concede that the best operators in our profession are enabled with a superior article of foil, to produce stoppings of a degree of perfection very nearly approaching all that is desirable in our art, yet it must be admitted that the *ultimatum* is not yet reached, a *perfectly solid* stopping has not yet been made with foil—a perfectly solid mass whose particles are so entirely intergrafted, that it may be rolled out into a plate, or drawn into wire, and possess all of the characteristics of plate and wire obtained from melted gold. To be met here with the statement that gold stoppings are already produced of such a high degree of excellence as to answer all practical purposes, or even to endure every test but the last referred to,

does not reflect upon what we have assumed, or divert us for a moment from our object. We may be critical, but we are aiming at perfection.

If the experience of the future shall prove, that an article of plastic gold can be produced, so conditioned, that its particles may be consolidated into a mass, so perfect as to answer all of the tests that could be applied to melted gold, we are bound to regard it as a higher approximation to perfection than any hitherto attained.

The needs of the profession in this direction, have long been felt and acknowledged; and it has been the constant aim of those most anxious for the advancement of our art, to produce an article which would endure these high tests.

To this end various attempts have been made to produce an article of *sponge gold*, or gold in such a finely divided condition, that on pressure it will weld into a solid mass.

In the July No. of the Journal, reference is made to the process by which several kinds of sponge gold has been produced. We will allude to these.

First, that produced by oxalic acids. Although it is precipitated in a minute state of division, it is exceedingly brittle, partakes of the quality of a powder rather than a porous mass, is difficult to introduce into the cavity of a tooth, and when introduced, often gives a brown stain to its surrounding walls.

Sponge gold made by fusing gold and silver together, and then extracting the latter by nitric acid, though better than the article just referred to, is of poor quality, in consequence of the imperfect manner in which the silver is extracted, from its being in comparative large masses, and also in consequence of the presence of foreign metals not soluble in acids. It lacks the quality of toughness, is managed with great difficulty and is subject to great waste.

That produced by *aqua regia*, though liable to be impure, is still far superior to either of the others, and until recently represented the highest advancement in this direction; though friable it is more plastic and manageable, and with sufficient time and proper care can be resolved into a stopping of great solidity.

While in Europe a little more than a year ago, Mr. John Tomes, surgeon dentist to Middlesex Hospital, London, showed us an article of sponge gold uniting more desirable qualities than we had hitherto any knowledge of. It occurred in irregular rounded masses or pellets, a little larger than an ordinary sized pea. Its surface was of lighter hue than its appearance within, glistening at different points, as though since its formation it had been subject to a high degree of heat, yet without diminishing its softness or pliability. On breaking it open its peculiar spongy character manifested itself in a most beautiful degree, its infinitesimal particles uniting together, forming a dense and delicate network. We filled two or three extracted teeth with it, forming large and exceedingly hard stoppings. After polishing these, with a graver we engraved lines and letters upon them, which on being subjected to a powerful lens, displayed the angles of each groove as clean and sharp as though it had been cut upon jewelry.

The only objection that could be urged against the gold referred to, was its want of a sufficient degree of plasticity, its disposition to crumble on being broken and consequent liability to waste in using. It seems, however, that Mr. Barling, the maker of the article, has recently succeeded in overcoming this objection to a great degree.

To Mr. Joseph Barling, No. 9 High street, Maidstone, Kent, is the profession indebted for this beautiful article so full of promise to our profession.

At the same time, and without any knowledge of the experiments or success of Mr. Barling, Dr. A. J. Watts, Chemist, of Utica, N. Y., was pursuing a series of chemical experiments with reference to obtaining an article of sponge gold which should supply the wants of our profession, and shortly after our return, he placed in our hands for trial three different articles of sponge or minutely divided gold.

The first is of a highly crystalline character. The second is in lamina, made up of exceedingly fine granules. The third is in a spongy arborescent form.

The first, or crystalline gold, with proper care and handling,

forms a solid plug; but unless great care is used, is subject to considerable waste.

The second, or laminated gold, is a much better article from its tougher character and extreme adhesiveness, but from the thinness of its plates, the operation of filling is rendered extremely slow.

The third, or sponge gold proper, is in the form of a cake, from one-eighth to one-fourth of an inch in thickness, of a compact, spongy, arborescent character; possessing, in the most eminent degree, all of the desirable qualities of the above—toughness, compactness, pliability, together with plasticity, and the highest degree of adhesiveness.

The method of producing the first, or crystalline gold, is familiar to the readers of the Journal. The mode of preparing the second and third is not yet published, but they are evidently prepared in an entirely different manner from the first.

With this last article we have had considerable experience, and with uniform satisfaction, especially in large stoppings.

In using the sponge gold, we adopt the following method: With a sharp blade we cut off from the cake of gold a sufficient quantity for our present purpose; this we anneal thoroughly with an alcohol lamp, and then, spreading it upon a clean paper before us, we cut it up into fragments and pellets best adapted to the cavity into which it is to be introduced.

Being previously provided with various instruments, whose extremities are subdivided into two or more points, we, by pressure upon the sponge, readily induce it to adhere to them, when we carefully carry it to its destination in the cavity of the tooth, which has been previously dried with paper. As the operation is repeated, accompanied with thorough packing and pressure, it will be found that the particles of gold readily weld together into a solid mass; so that when the stopping is completed, it in all respects resembles melted gold, and may be subjected to the same treatment with impunity. For the purpose of determining its various qualities as a stopping for the teeth, we subjected it to the following tests:

To test its *malleability*, we took a large plug of gold formed in the manner just described, laid it upon an anvil, and with a

hammer beat it to flatness; annealing it, we passed it through a rolling mill, when it was formed into plate, as perfect in all its characteristics as any plate made of pure gold.

To test its *ductility*, we took a similar plug, formed as before, and drew it out into wire as fine as No. 80, Stubbs' plate.

To test its corking or stopping quality, and the impermeability of its antagonizing *joints* to fluids, we took a piece of thick glass tube, about a foot long, into one end of this, to the depth of more than half an inch, we introduced a stopping of sponge gold. Inverting the tube, we poured into it a solution of red saunders; we then closely fitted a piston and rod to the tube immediately above the fluid, and upon this applied a weight. At the expiration of twenty-four hours, the fluid had not made the slightest progress downwards.

To test its ability to being built up into irregular and independent shapes, we have repeatedly reproduced from one-half to three-fourths of the entire crowns of molar teeth, *in gold.* As a further test, we took a block of ivory, *chucked* it upon our lathe, and with small tools, formed a matrix to correspond to the size of a large finger ring. Into this we introduced, by packing and condensing, as in stopping teeth, more than five dwts. of sponge gold; placing it back upon our lathe, we turned out the ivory within and without the golden circle, until it became entirely separated; this readily endured all of the necessary process of filing, stoning and burnishing into a beautiful massive gold ring, which has been worn constantly for several months, and will, in all respects, stand trial with any pure gold ring made in the ordinary way. It has this advantage, however, over all rings made heretofore, it *is* a *ring*, an uninterrupted ring, and "has no end," a continuous circle with no *alloy* between!

As a test of density, well formed plugs do not shrink under the blow-pipe; their inner surfaces are bright and solid, while their polished disks take the graver like plate.

Under the microscope it presents a beautiful and gorgeous appearance, like looking into a golden sylvan grove, each mossy or arborescent branch being in the form of a six-sided crystal.

Although we consider Dr. Watts' sponge gold indispensable to our practice, yet we do not think it will ever entirely supercede the use of gold foil. It can often be used to great advantage in combination with gold foil. In large stoppings it possesses great advantages over foil, from the facility with which it can be introduced, and consequent freedom from the fatigue which ever accompanies long operations.

We think no one in our profession who has had experience in its use, would be willing to be without it.

Dr. Watts is deserving of great praise for his persevering course of experiments, which have resulted so favorable to our art. May he reap the abundant reward he deserves.

Errata.—Page 347, 6th line from the bottom, for intergrafted, read *integrated.*

ARTICLE III.

Third Apocryphal Report of the Proceedings of the Mississippi Valley Association of Dentists. Prepared by A. M. Leslie, D. D. S., F. M. V. A., Author of the two preceding reports and some other matters—humph—a-hem.

Messrs. Editors:—I owe your readers an apology for so long deferring my annual account of the progress of your western brotherhood. The best I can make is to state the truth, I have been very much indisposed—to the use of the pen, and am even yet an invalid. Still the advantage derived by the profession from your publishing my first report, which opened up the discussion on professional patents, followed as it was by the admission of the views of many others pro and con, by which some were taught that they could not shut out the light of the press, however easy it might be to trample on the rights of the individual or throw their weight into the balance they had formerly unmercifully kicked—prompts me to continue the reports. Fearing from remarks I have heard and some things which have been published, that my actual indifference to the base and

slanderous attack made on me through the pages of the Journal, in a paper styled "A Review" of my report of the Louisville meeting, may be construed by some into a refusal of space in your Journal for my reply, I will here say that the writer of that and the cause he worked for, are welcome to the force of all the personal aspersion he has endeavored to cast on me. The time will come when he shall eat the fruit of it. Whether this shall prove figs or thistles will depend on the *facts*, not on *personal abuse;* my cause needs not the latter, and I am above it. When the harvest time arrives I shall be pleased to avail myself of the pages you so kindly offered on the occasion of the review. In the mean time, let me say to the writer of said review, that I enjoyed it much, as in addition to that which is generally derivable from his writings we got him to *express his views at length on the subject of patents.* This may be valuable for reference, as it leaves less room for ambiguity. There are some other things in which the report has induced him to give his views "*at length*," and there are still some others that I should like to see him "delivered of" on paper, just that we might know in future where to stand, and we to find him. I am pleased to say that our editor has since that report appeared more in the press than formerly. I do not claim credit for this, oh no, it may be only a coincidence.

The title of my reports, you perceive, I have changed, simply because their nature will thus be more clearly represented to the *slow* reader. They are apocryphal only in the sense that they are not canonical, not "approved" by the council. Apocryphal because they contain words and acts *not allowed* to go into the canonical story, not because they are not true, but for the reason that they are *too* true. What, you may be ready to say, has there been more curtailing? Yes, verily, but this time moved doubtless by magnanimity, and in order that I may be relieved somewhat from the weight of favor I am under, I will at the outset, though out of place, give the apocryphal part of my report. Having before, from a sense of duty, spoken out that which the society thought derogatory to it, I could not but

consider myself partial to myself if I did not uncover that which may, by some, be considered very magnanimous.

Very late on the evening of adjournment the following preamble and resolution were presented by Dr. Watt:

"Whereas we believe that all associations have a perfect right to transact their own business in their own way, therefore

"*Resolved*, That when our society, by direct vote, resolves to screen from the public eye a part of its proceedings, believing that its best interests require such course, we have a right to expect that members will comply with the spirit of such resolutions, and, at least, refrain from publishing imperfect, self-laudatory reports."

Said resolution having been seconded, and some one having expressed doubt of the necessity of the same, Dr. Leslie suggested that the mover doubtless could explain.

Dr. Watt explained by saying that reports had appeared by some one signing himself A. M. L., and said to be a member of this society, in which reports, things were exposed which the society deemed proper not to make a minute of, and members found themselves after their return home, reported to have said that which they could recollect nothing of. It was to prevent this, and have only such matters published as the society approved, that he offered the resolutions.

Dr. Allen saw just about ditto to the foregoing, and thought the adoption of the resolution necessary.

Dr. Leslie remarked, that he had very little to say on the matter, especially as he had just been informed by our host that things more worthy of discussion than this awaited us in the next room. He would, however, say that he approved in general of the sentiment, and if he voted at all he would be most likely to vote for it, it being, however, like all other generals, *subject to exceptions.* He would assure Dr. Watt that he was correct in supposing that the reports alluded to were prepared by a member of the society, and further the resolution would not necessarily have the desired effect.

The resolution passed without a dissenting vote.

On motion, it was *Resolved*, That no record be made of the resolution just adopted.

This also passed without a dissenting vote.

And now, Messrs. Editors, I am done with the non-canonical part, no one can object to the exhibition of the society's magnanimity as shown in the last resolution, much less can they to the establishment of its dignity by my voluntary publication of the first.

In my report of the former meeting I concluded by saying, that the society separated with a general expression of belief that a more useful future was open before them. The truth of this the present meeting has just proven. It has been the largest, as well, I believe, as one of the most useful ever held.

The meeting was presided over by Dr. Taft, with evident ability. Through the business committee, aided by the chairman, a system was given to the proceedings which made the discussions practical, profitable and partaken in by all the members; this brought out a variety of thought and modes which told plainly that the books are not now blindly followed.

The President opened the meeting by reading a neat and appropriate address on the "Past and Future of our Profession." This was well received.

Dr. Watt read a short but searching essay on the principles involved in professional advancement and intercourse. It produced some wincing among those who draw any nourishment through "the monster at Washington." Its publication was not very promptly desired, but we made out to secure the society's request that it be printed, which has been accomplished after four months.

Dr. Allen here took the floor to explain his position on the patent question, and his views of the society's action at a former meeting. He held forth in a loose style of animated declamation peculiar to himself, in which he repeated the oft exploded idea that patent laws are the *parents* of invention, (the almighty dollar obscures his vision so that he sees not *necessity*, the true mother of it all, known to all from Adam down to Arkwright and the inventor of the cotton gin.) And the doctor held that *nineteen-twentieths* of the profession thinks as *he* does. I can pity his ignorance, but cannot excuse his impudence, in stating

anything so lacking the truth, and this to a society who has voted his course derogatory to his professional character.

All of this speech he makes out of order, and no interruption offered; and when I seek an opportunity to correct his gross misrepresentation, then it is all out of order; and when I offer a resolution which will give opportunity, it is voted down because—oh, yes! "because Allen had all the time he wants"—he tells them so, "and, they think the time can be better spent." "Oh, yes!" says the Dean, "we cannot spend time on that." And so the untruth, that only one-twentieth part of the profession disapprove of dental patents, must be allowed to pass uncontradicted in the presence of a dozen young men who are being *prepared for future usefulness.* Is it because they (the dental class) "brought down the house" with thunders of applause at the end of said speech? Teachers of youth should be wary what examples they set.

The society having resolved to proceed with the discussion of the subjects suggested by the executive committee, the first item was taken up.

"Best method of cleaning teeth and removing "green stain," deep seated, from the teeth; also, the best article to be used for that purpose."

Dr. Griffith said: He first took a sharp instrument and removed all he could with it; this he followed with slips of pumice stone; he then finished off with some polishing powder, say chalk applied by pine sticks. But one of the best things he had found for the removal of this stain, was an article, the value of which he discovered while practicing in South Carolina; it also made a most excellent dentifrice. This was the ashes of the husk of the rice plant. Its mechanical action is rapid.

Dr. Ulrey prefers the use of pumice stone and alcohol, applied with wood, as the instrument for the removal of the green stain. Has in some instances had to remove nearly all the enamel before accomplishing its perfect removal.

Dr. Allen has been in the habit of using diluted muriatic acid in cleaning the teeth, being careful to follow it immediately

with an alkali, and believes, that with care, this practice may be pursued with impunity. To neutralize the acid, he uses fine Windsor soap or soda. Done neatly, the public may be kept *ignorant* of the use of the acid. Said he could use it so as not to injure the tooth, by leaving it to operate just long enough to act on the foreign substance.

Dr. Bonsal deprecated the use of acids for this purpose. His practice is to remove it with pumice stone.

Dr. Griffith disapproved of the use of acids, and thought the use of pumice should be guarded. In illustration of its injudicious use, he stated he was once consulted by a lady, a relative of Commodore Porter. She had been advised by Dr. Castle, of Baltimore, to use pumice as a dentifrice, and by its use she had, when he saw her, cut away the labial surface of the incisors, until the teeth were exceedingly sensitive.

Dr. Ayres thought it important to trace the chemical phenomena producing the stain; we might then be enabled philosophically to prepare an agent for its removal. He had heard the celebrated Professor Dudley, of Transylvania College, inculcate the doctrine, that the deposition of tartar on the teeth indicated a change in the system, which if removed, would produce secretions so altered as themselves to be the means sufficient for its removal by solution. Dr. D. taught that the earthy secretions in the kidneys and bladder were similar in chemical formation, and should be prevented by similar means. Dr. Ayres uses pumice freely on twigs of yellow poplar. He was not prepared to say whether this deposit should be attributed to an acid state of the secretions or not.

Dr. H. R. Smith uses rotten stone and pumice a good deal for the removal of the green stain. Was decidedly opposed to the use of acids on the teeth; he could not see how injury could be avoided.

Dr. Leslie thought it important in arriving at a correct opinion on this subject, that we first settle, whether the "green stain" be a deposit on the tooth or a staining of the substance of the tooth in the form of a dye. His own practice had been based on the supposition that it is a deposit, and that the hard

deposit was made up of the same ingredients as the soft; that it did not enter the substance of the tooth until the surface was injured by the ordinary destructive agents. Viewing it, then, in either case, as a substance to be removed, he thought that way the best which would leave the smoothest surface, and do it the speediest. This, he believed, was to be obtained best by the edge of a sharp cutting instrumeut, followed by some polishing powder or substance; he preferred scotch stone; sometimes he entrusted the latter part of the operation to the patient—a ten minutes use of powder and brush, in most cases, being sufficient—in more important ones the burnisher adds much to the improvement of the surface. He would not attempt to decide what causes operate to produce this deposit, but thought an acid state of the fluids would not be found when the deposit was hard and black. When this and the surface of the teeth under it were partly decomposed, would consider it to indicate the action of acid. From recent observation he was inclined to believe we had too much overlooked the action of the abnormal secretions of the gums. He had enjoyed a very favorable opportunity of watching one case belonging to a class recently pointed out by an anonymous writer, viz. Scrutator. It was a very clear case of the type. When first observed, there was the yellow line of ulceration about half a line wide, pouring its secretion down on the superior incisors, which, up to this time, were white and clean, but which now rapidly assumed a yellow tint just below the ulcer. This state continued for a couple of weeks, the case being closely watched, but nothing done to arrest it. This course was adopted *that some tangible results might be arrived at.* By this time the surface attacked was a dirty brown, and the enamel decomposed across the surface of the teeth for about the width of a line and a half, being deepest in the centre of the teeth and vanishing towards the approximal surfaces—the left lateral incisor being the most injured. About the end of the third week, nothing having been done locally or constitutionally to counteract the disease, it was observed that the yellow ulcerating line of gum had changed its appearance. Its color now was natural and its

acrid discharge arrested. This case evidently owed its origin to a *constitutional derangement*, ("not to candy or calomel,") the manner of removal of which is beautifully illustrative of the existence of the *vis medicatrix naturæ.* It may possibly be also illustrative of Prof. Dudley's idea, but it certainly, so far as one case goes, very fully supports the theory of "Scrutator."

The treatment of these teeth afterwards, was, in a few days, to remove with a sharp instrument, all the decomposed portion and polish them. Since then there has been no return of the disease, and *consequently* no further progress of the decay.

Regarding the suggestion thrown out by some members that it was probable that dentifrices might be prepared for use in cases having a tendency to the deposit under consideration, and which would prevent such deposit, the fluids of the mouth being either acid or alkaline, as may be proven by test paper. He would say, that he thought that the use of alkalies in dentifrices was not as guarded as it ought to be. It seemed that many overlooked the effect of such agents on the animal portion of the teeth, which of course is freely exposed to this affinity wherever decay is progressing.

It would be safest to combine in tooth-powders in general use, no more active neutralizer than creta preparata. This combined with an astringent will accomplish the chief results to be derived in a dentifrice, equally so with those that are formed of six or eight ingredients. Of course no objections are had to a little matter to throw a blush over the chalk.

Dr. Ulrey thought the green stain had an acid origin. He endeavored always to impress upon his patients the importance of the constant use of the brush and a good dentifrice. He was fully satisfied the most important period of the day for cleaning the teeth was just before retiring to sleep, as acids left in the mouth have then undisturbed possession for hours.

Dr. Griffiith said he thought the stain should be considered as a deposit, and believed it should be attributed to an acid origin.

Dr. Watt did not believe that the presence of holes in the

enamel mentioned by some as accompanying this stain or deposit, proved that it had an acid origin, but only might be considered as proof of the presence of an acid combined with it.

Dr. Ayres uses an instrument when the enamel is softened. He prefers a tooth void of enamel to one with a mushy surface.

Dr. Peebles did not believe acids could be used with safety for the removal of the green stain—prefers the instrument and some polishing substance. Had found that this stain was confined to persons under mature age.

Dr. Taft thought it well to inquire into the action of the ashes of the rice plant mentioned by Dr. Griffith. If its action was so much more rapid than any other agent the doctor had met with, it might be attributable to some chemical affinity. The action of the ashes were doubtless alkaline, and if acid entered into the formation of the stain, the chemical effect was easily traceable. Then there was the mechanical action, which is said to be great, doubtless owing to the silica entering into the formation of the husk of the berry.

The origin of this deposit he thought somewhat obscure, but inclined to the belief that it results from an acid state of the fluids.

Dr. Goddard presented the following query:

"What is the best application which can be made, to remove the sensibility occasioned by the use of the file for removing decay on separating teeth?"

Dr. Goddard said he could find only two substances that could accomplish this. These were arsenic and cobalt, or free stone. He did not, however, approve of the use of these, and was anxious to know if there were any safer modes known to the members, as he had, in his own mouth, a tooth which had been cut away freely to remove caries, but there remained great sensitiveness in the dentine.

Dr. Griffith had always found entire safety in the use of arsenic when combined with charcoal. This was his mode of treating very sensitive teeth, and he could confidently recommend it.

Dr. Allen had found gum-camphor and alcohol, and also a

solution of tannin in alcohol valuable in his practice when he met with very sensitive teeth. He had while east last summer presented to him by a dentist, a substance prepared and sold by Dr. Brewster, of Portsmouth, N. H., and which was designed for the obtunding the extreme sensibility of the teeth. Dr. A. here produced a small vial, duly labelled with the inventor's name, directions for use and the price. The substance was blackish-brown in color, brittle and very slight metallic taste, was in small broken fragments about half a line thick.

Dr. Peebles was in the habit of using a burnisher slightly heated in cases coming within the query of Dr. Goddard. He had found the cold burnisher sufficient in many cases. His purpose in this practice is to close up the pores of the dentine and prevent the egress of irritating fluids.

Dr. Ulrey, in speaking of the main objection to the use of arsenic for the purpose under discussion, viz. the liability of absorption, said he was applied to twelve years ago to allay sensibility in a broken tooth. He applied arsenic; the tooth continued sore for two or three months and subsided. He recently extracted the same tooth, broke it and found the tooth dead.

Dr. Smith said he believed he could let the society into a secret regarding a material for obtunding nerves. He did not know that it was exactly identical with that presented by Dr. Allen, but he thought it *very like it.* It was originally given to him by a doctor in Buffalo, as a profound and valuable secret, his friend the doctor having paid some one fifty dollars for the recipe. The mode of preparing this miraculous obtunder is to mix up some gypsum with water, add a little arsenic and color it to suit the imagination, pour it out in thin sheets, when set, break it up into fragments, it is then ready to bottle, label and sell.

Dr. Taylor makes use of a burnisher sometimes for the removal of sensibitity. He has met with great success in the use of nitrate argenti when great tenderness of the dentine existed. He had found this substance very useful when the clasps of a plate had been the cause. In one case a lady had worn some artificial teeth but two years, when the decay and sensibility

was such that the teeth could not be worn. He cut away the decay and applied the silver, when the tenderness was removed and she wears the teeth. Has applied the silver four or five times, in the course of as many years, in the same case since.

ARTICLE IV.

Valedictory Address delivered before the Graduating Class of the Baltimore College of Dental Surgery. By W. W. H. THACKSTON, M. D., D. D. S.

GENTLEMEN OF THE GRADUATING CLASS:

As the enlightened traveler stands upon some distant shore, amid the evidences of present, and monuments of past, magnificence; in the blaze of courts and the pomp and pageantry of thrones; surrounded by the ruins of art, whose splendor once untarnished, was the model and pride of ancient genius; but whose faded glories, like the religion and philosophy that consecrated their walls, have been swept in the harvest of time. If some once familiar voice, fresh from the green groves of his far distant home, as he pauses before the most splendid wonders of that stranger clime should break upon his reveries, with what rapturous tumult of feeling would he turn from the scene, though the wreck of cities and empires lay around him to grasp that oft-pressed hand, and hang with delight upon the familiar accents of his native tongue.

The principle of association which so changed the traveller's reveries, and recalled a thousand images of love and affection, carries us back over a few intervening years, and places *us,* no indifferent or reluctant actor, in such a scene as this. The sympathies which you feel, the friendships which you cherish, the lively recollections with which you look upon the incidents of your connexion with your alma mater, and the bright and ex-

ultant hopes with which you look upon the theatre of the world; these, these, are no strangers to us. We know, too, the toils and labors of your career, but still we know, that whatever is divine in genius or beautiful in sentiment, whatever is high and splendid in philosophy, have awarded with golden fruit the severities of study, and thrown the colorings of enchantment around the cultivation of science.

And proud as we may be, gentlemen, to renew our connexion with these halls of learning, under circumstances so flattering, we are nevertheless admonished of the difficulty of meeting the expectations it may excite, and we only encounter the occasion because it is associated with some of the freshest hours of our existence—some of the warmest recollections of our youth, with the remembrance of ties, whose moral unity is yet unbroken, and friendships, whose light shines on unextinguished, though brushed by the raven darkness of the wing of time.

It was our good fortune to enjoy the advantages of professional training in this institution, to be in some degree identified with the first workings of a new and untried enterprise; twelve years ago, it was our proud privilege to occupy, with only two others, the position to which you have this evening so honorably attained. Those intervening years have passed swiftly away—we have participated in many of their stirring incidents, and we have experienced our full share of their changes, their sorrows and their joys. But the lapse of years leaves undimmed, the impressions of that hour. We then felt what you now realize, that the crisis had come when we were to put on a new character, that we were thenceforth to take our position among men, and under God, maintain it *as a man*, self dependant and self reliant.

And though we have not subsequently realized all the dreams and aspirations of our youth, though we have not achieved that distinction, or gathered those laurels of triumph which then hung out in luring splendor as incentives to effort, our failure can in nowise be charged to lack of faithful counsel and instruction, to no false principle or philosophy here inculcated, or to any improper example, set before us by the faculty of this

school. And when you go hence to-night, you will go feeling, that whatever fate the future may hold in reserve for you, whether you realize your golden visions of wealth, or the nobler reward of just and merited fame, whether it be your future destiny to climb the steep and rugged hill of science, and leave the impress of your genius upon its lofty summit, or whether you perish at its base, "unwept, unhonored and unsung," your alma mater, while sharing in your laurels, and rejoicing in your success, may not be justly reproached with your failure. She has gathered you to her bosom, has nursed you into strength, has taught you to stand and to walk among the votaries of science. She now unfolds her arms, points you the path to usefulness, to fortune and to fame, and bids you go with her blessing upon your heads.

The time was when an occasion like the present would have been most opportune for an "expose" of dental surgery, its claims to be regarded as a science, and the necessity of its recognition as an honorable and useful specialty of the healing art. But happily, gentlemen, that day has gone by. The world now very correctly apprehends the nature and importance of your chosen pursuit, the world is learning, that its duties and requirements are fully up to the capacity of the most gifted and cultivated among men, and believe me, the world is fast becoming as intolerant of dullness and mediocrity in its ranks as once it was of its appeals for caste among the sister sciences.

We shall, therefore, not detain you with a disquisition or analysis of dental science, its divisions and relations, but will ask your attention to a few observations upon the duties and obligations you are now to assume, as practitioners, and as alumni of this institution.

You have enjoyed every advantage and facility that the present age and condition of science affords, to thoroughly fit and prepare yourselves for the important part you have chosen in the drama of life. Your presence and position here to-night abundantly testify how truly you have appreciated, and how well you have improved those advantages. Your blushing honors, and the approving smiles of your friends and precep-

tors, alike betoken your high resolves, and the energy and fidelity with which you have thus far sought their accomplishment.

But is your education completed? are your efforts to cease with this occasion? have you reached the *ultima thule* of your aspirations? will you go hence, content with the laurels you have already won, and invoke the favors of your profession upon the lone trophies of your young ambition? If so, sad and melancholy will be the fruits of your brilliant accession to its ranks; your course will be fraught with ruin, and your brightest hopes end in disappointment.

Such, however, have not been the lessons you have here learned, and such are not the sentiments and feelings with which you will leave these halls. You have here, if not elsewhere, been taught what education means; that it is not the work of a year, or a series of years, but of a life, devoted to the evolution, development, discipline, and application of *all* our faculties to the objects and exigencies of our calling. And while you have graduated to the honors of this, the first preparatory school known to dental science, you hold in its diploma but the matriculation ticket to the great school of practice, of patient investigation, of untiring research; that school, whose broad domain yet reaches far over rich fields, that bear foliage of perpetual verdure; flowers "that yet bloom and blush unseen;" fruits that stand whitening to an abundant harvest, but no foot-prints of discovery. It is your mission now to explore those untrodden solitudes, to gather those bright flowers of philosophy, those rich fruits of science, and bring them as votive offerings to the altar of your profession.

Science and art, the twin sisters who so beautifully and harmoniously blend their characters and attributes in our calling, are ever growing, ever moving, ever adding to their already full stature and lofty proportions; ever traveling onward and upward towards that perfection that dwells in "light inaccessible." The achievements of to-day are but the finger-posts that point to the discoveries of to-morrow; the triumphs of to-morrow will reveal some hidden truth or develop some richer treasure for its successor.

Science has been eloquently described, "as *not* a pile of building materials where there is contact but no connection, but an edifice vast and magnificent, but unfinished, with its scaffolding still standing and the rubbish of the work still about it, yet an edifice which, when viewed from the vantage-ground of the far-off future, and in the light of the judgment throne, will be seen to have its deep foundations in the eternity of the past, and its culminating dome in the eternity to come." Do you desire to contribute some of the material for this noble and enduring structure? Are you emulous of having your names inscribed in living characters upon its outer walls? Let it then be your firm and abiding resolve to abate not one jot or tittle of your energy in the struggle for excellence and eminence.

From the inherent character of science, and the progressive tendency of the age, you may not safely pause; to loiter by the way, or to stand still, is to retrograde. Let then each day and year be marked by the development of some important truth, or the acquisition of new and valuable resources in your department. You take with the diploma of this school a high moral obligation, so to exercise and cultivate your talents, as that something may thereby be added to the common fund of knowledge. You have here freely and largely availed yourselves of the labors and accumulations of all who have gone before you, and every rule of right, as well as every principle of good morals, demand that you should at least pay interest upon the appropriation. See to it, that you waste not your time upon trifling and ignoble pursuits, lest the "talent you have, be taken away."

You have already learned that there is no "royal road to knowledge," neither is there any easy path to just and honorable fame, "all human works that are good and of value are brought out of labor and difficulty," and the most successful are those who put forth the greatest and most unbending efforts to be *useful* to their fellow men; for after all it is the *usefulness* of any department of science; its capacity to meliorate the condition of man and to minister to his many necessities, that gives to it its value, its dignity and its honor.

Fortunately for you, your lot has been cast upon an age when the usefulness and value of your specialty of the healing art is universally acknowledged; when the facilities for its cultivation are most ample; when the necessities and appreciation of our fellow-men demand the daily ministration of its offices; when its history, though brief, can point to names of worth and merit that would shed lustre upon any pursuit, besides *living* examples of excellence and renown, who have risen in many instances from obscurity, and by the force of genius and energy, have wrought positions and characters that would adorn any vocation of life.

Let these considerations determine you to be close students, as well as industrious practitioners, so long as you exercise the functions, or challenge consideration as dentists.

And this implies that you not only read carefully, and digest thoroughly the literature of your profession proper, that you not only keep posted, in the discoveries and improvements of your specialty, but that you should make the kindred branches of medicine and general surgery, objects of close study and careful investigation. We need not remind you of the intimate relationship which these several departments of science sustain, or tell you that neither can be clearly apprehended, or successfully practiced, without some knowledge of the others.

The physical sciences and the mechanical arts are also subjects of indispensable interest and importance to the dentist. Without the aids derived from these sources, especially the latter, we should be as impotent in practice, as helpless and hopeless in our element, as would the lone mariner, with chart and compass, but without rudder or sail to guide him "o'er the trackless deep."

And yet, to our mortification, not to use the harsher term, disgust, we find, in some few instances, a growing disinclination to be regarded as at all mechanical, a disposition to cast off and disavow those operations ordinarily designated "mechanical operations," or operations in "mechanical dentistry," and that, for no other reason that we can perceive, save that ignorant and vulgar pride, has ever looked with scornful eye and upturned nose upon every species of labor as in some degree degrading.

But we need not pause to vindicate the respectability of the mechanic arts, we need not make an argument to convince you that whatever contributes in equal degree to man's comfort and happiness, is equally respectable, equally honorable, whether elaborated in the silent chambers of thought, or forged by the brawny hand of toil. And let me impress the truth that it is your religious duty to avail yourselves of, and cultivate all the resources and appliances that Providence has or may place at your disposal, to make your profession in the largest degree a boon, to suffering, decaying, and dying humanity, nor deem yourselves degraded by any honorable agency to accomplish good.

In a word, gentlemen, we would have you ambitious, ambitious of distinction as cultivated virtuous men of science, ambitious as ministering servants to the ills and woes of flesh, not emulous of fame alone, for what is mere fame? It cannot ward off the calamities of life, or postpone the hour of death, the loudest notes of human applause reach not the cold and silent precincts of the grave.

Not of wealth, for "riches take to themselves wings and fly away," but we would have you emulous of that CHARACTER among your fellow men, founded upon the exercise of cultivated minds, the illustration of highest excellence in your profession, and the exhibition of the moral virtues and christian graces in your daily intercourse with society.

And here permit me to observe, that a proper reverence for that Being whose eye kindles the fires, and whose hand controls the motions of the universe, is the basis of all moral, as well as religious, principle. It subdues our passions, moderates our tempers, exalts our conceptions, and ennobles our impulses. It spreads the pathway of existence along valleys green with perennial verdure, and flings o'er the short twilight of life a portion of that immortality which is dawning beyond the tomb.

This is the distinction of which we would have you emulous, this the fame, if you please, of which the truly great have a foretaste in this life, and which carries with it the consolation "that to live in hearts they leave behind, is not to die." These

are the influences that will incite you to noble deeds, that shall cause your names, if not written in the pages of history, to be recorded in the memory of your fellow men, in characters so indelible that they shall stand the changes of time, and fade from remembrance only when its cycles shall cease to be told.

But, gentlemen, this is not a period in your career to be marked by mere passive musings and speculations, the tide of human events is not to drift you from these halls to a vast solitude, where you may pursue in learned leisure scholastic and scientific abstractions. But you are about to be called into contact and sympathy, with that energy and activity which marks the age in which we live. You are to begin the work for which you have here sought preparation, you are now to try your strength with the more stern realities of life; enter into the struggle with brave hearts and willing hands. Let not indolence eat away your precious hours, let not the leaden wing of sloth cast its blighting shadow upon your pathway.

"Wide is the field of your usefulness, varied and important the duties of your office; it may not be your vocation to keep sad vigil beside the couch of death, to count the ebbing strokes of life's failing tide; to utter the fearful words, which like ice-bolts rive the heart, or to speak the blessed accents of hope that clothe the pale countenance of the midnight watcher with smiles;" yet in the sphere of your duty the responsibility is relatively great. The issues of life and death do not often hang upon your operations, yet they sometimes do—but if this were never so, still there is yet enough of happiness or pain involved, to keep alive that just sense of responsibility and earnest solicitude with which you should ever approach their performance.

Carry into your professional practice all the kindlier sympathies of your nature; be gentle, patient and forbearing with those who ask your assistance; seek to assuage their sorrows, and mollify the stern ministrations of your art by amiable and considerate deportment, yet always be firm in the exercise of your best judgment, yield not to the shrinking of the timid and weak, make no compromise with the dictates of ignorance or caprice, conduct every operation in accordance with your con-

victions of the right and proper way—and if this be not submitted to or acquiesced in, why politely decline the case. It is better to lose an ignorant or whimsical patron than to forfeit your self-respect, better to hurt your pocket than stab your reputation.

As your professional and social relations must bring you in contact with the cultivated and refined, be ever mindful of your appearance and deportment. We believe it was Chesterfield, who pronounced a tasteful dress and polished manner the best letter of introduction, and rest assured that to dentists this maxim applies with peculiar force. Nothing will more readily inspire respect, or more warmly attach your patients than scrupulous neatness and attention to personal appearance, combined with graceful and easy manners.

Let it not be supposed, however, that in advocating the cultivation of our social powers, we countenance the contemptible littleness of dandyism. The mere dandy or fop we despise as a thing whose proper definition the great American philologist and lexicographer has given in the following appropriate terms, "a male, of the human species, who dresses himself like a doll, and carries his character on his back." Between the peculiarities of such a creature and the dignified suavity and refinement of the educated gentleman, it were odious to institute a comparison.

A modest, dignified, unostentatious bearing, will render you most acceptable with all grades and conditions of society, arrogance and noisy pompous pretension are not held as evidences of worth, but are rather regarded as indications of conscious inferiority. "*Esse quam videri malim,*" is a safe and sound maxim, which you would do well to remember in all the relations of life.

In your intercourse with the profession, be always kind, frank and fraternal; a generous and lofty ambition may make you rivals, but can never make you enemies. Render cheerfully any service or assistance in your power to a brother in difficulty; communicate freely, whatever it may be your good fortune to originate or discover, not alone for the love you bear

him, not alone for the good of science, but for the respect you cherish for yourself; for he who conceals or appropriates any valuable discovery or invention in science, sullies his own good name with a stain that no time can efface.

With the unworthy of the profession, the ignorant pretender, while you can hold no fellowship, yet, by a kind word of counsel and encouragement, which you can well afford to bestow, you may show him "a more excellent way." But if you find him incorrigible and firmly joined to his idols, let him alone. Quacks in every department of the healing art, pettifoggers in law, and impostors in religion, have always infested society, and always will, until the ignorance and credulity upon which they grow and flourish, is lost in the light of milennial glory. And as vain and futile will be the *attempt* at their correction or extinction, while the elements of their reproduction and sustenance exists, as to change the laws of gravitation or arrest the march of pestilence, without correcting the miasm in which it breeds.

We have thus, gentlemen, imperfectly sketched some of the more important obligations to science, to society, to your professional brotherhood and to yourselves, which you have assumed as dentists. And, in conclusion, we wish to utter a few reflections upon the obligations you owe as graduates and alumni of the Baltimore College of Dental Surgery.

When you have left these scenes and associations, to enter upon your respective fields of labor, when you begin to taste the sweets of professional success, and to realize the fruits of your well directed efforts, remember your alma mater, and that you have here left those who have toiled with you, and for you, who will cherish a lively interest in your advancement and promotion; who will ever feel in your individual success and happiness the most anxious solicitude, who have committed to you their own good name, and no unimportant agency in their own ultimate destiny. We believe that you will prove worthy the confidence reposed in you, and that you will preserve intact the honors with which they have vested you.

Twelve years ago, we found that it was something to be the accredited alumnus of the first and then the *only* college of dental

surgery, and that, too, in its infancy. The result of the experiment which it then was esteemed, its utility and permanency, were to be determined by its fruits. It was then something to be the representative of its teachings, and the bearer of its diploma. But how much greater matter is it now? now that its permanent existence and necessity have become fixed facts? now that the utility of the scheme has been demonstrated, and its policy generally approved? now that its diploma will at once command respect, and inspire confidence throughout the civilized world, how shall we estimate the worth of our alma mater, and what limits can we fix to the obligation which her maternal care and far-reaching influence has imposed?

The establishment of this institution, and its maintenance, has cost years of self-sacrificing toil and anxious solicitude, and one would think, in contemplating the intrinsic worth of the scheme, the patient and unremitting effort which has been applied to its successful prosecution, and the rich and satisfactory results which have already been realized; that it was an enterprize that would enjoy the approval and good will of all men. But no, it offers no exception to the general rule, that nothing in this world, however good, or however great, can claim exemption from the assaults of wickedness and folly.

Esau, gentlemen, though a somewhat notable example, and representative of an unfortunate class, has, notwithstanding, had successors and disciples in every succeeding age, who have ever stood ready to sacrifice their richest treasures to the gratification of unholy appetites and unhallowed passions, and our own profession, in this enlightened day, can furnish examples of wanton recklessness, that would barter our rich heritage for a "mess of pottage," that would, for a paltry and selfish gratification, despoil our temple, overturn its altars, and shiver its shrines.

It is a duty imposed upon you by every sentiment of gratitude, of patriotism, and of chivalry, to stand by your college, and the system which it illustrates, to guard its courts against the goths and vandals of the nineteenth century, to strengthen its foundations, and add to its graceful proportions.

Let us be true to ourselves, true to the trust committed to us.

> "We are but few, a little band,
> Be faithful till we die,
> Shoulder to shoulder let us stand,
> Till side by side we lie."

Let us show ourselves worthy our high birthright, and the Baltimore College of Dental Surgery will hold, through time, its position as first and noblest of its kind. It may pass, (as it has already done,) through hours of darkness and trial, the storms of calumny and traduction may beat upon it, envy and malice may pour upon it the venom of their thousand tongues. But it will stand sure and steadfast, an imperishable monument of the wisdom and benevolence of its founders, of their concern for the promotion of science and the welfare of men.

> "As some tall cliff that lifts its awful form,
> Swells thro' the vale and midway leaves the storm,
> Though round its breast, the rolling clouds are spread,
> Eternal sunshine settles on its head."

Gentlemen of the Graduating Class—Our part in the exercises of this occasion is accomplished. It only remains for us, as a representative of the profession you have chosen, to extend to you the right hand of fellowship, and a cordial welcome to its ranks. May your success in life be commensurate with your merits, and may your merits shed undying lustre upon your names. On behalf of the Faculty of this school, we bid you farewell—not in the sadness and gloom of a final and hopeless separation, but in the joyous trust, that we shall meet you again—bearing the rich fruitage of well spent years.

ARTICLE V.

Opening Address delivered before the ASSOCIATED ALUMNI OF AMERICAN DENTAL COLLEGES, *at a Meeting held at the* BALTIMORE COLLEGE, *March* 2, 1854. By ELISHA TOWNSEND, D. D. S., M. D.

GENTLEMEN:

Your association is so happily adapted to those exigencies of the profession which it is intended to meet and answer, it is so clear an index of our rapid progress, and so conclusive a pledge for the early fulfilment of our highest hopes, that I can find no words fittingly to express my apprehension of it.

It seems to me quite impossible for *you* to understand the feelings with which the men, whom I am understood to represent here to-day, look upon the organization of the Society of the Alumni of the Dental Colleges of America.

It is an *era* to *you*, from which you will measure the onward march of your own development and achievements for the profession—it is an *epoch* to us, that marks an advanced stage of attainment, a resting place in the history of our labor, a new-year's day in our calendar, bounding one complete cycle of progress, and opening another in perspective. To *you* an expectation is born, to *us* a hope is fulfilled, an aspiration is realized, a task is accomplished, a long wished, toil-won eminence is reached.

This, which is your present and point of departure, is that future of our early hopes to which our eyes have looked and our steps have tended, as to an accepted terminus of our fond ambition, and the feeling is strong upon us to sit down now and rehearse the history of the past, its struggles, and its triumphs, and live over again in the accomplishment the pleasures which it so often yielded us in the anticipations of an assuring faith.

Our eyes would fondly linger by the way, tracing on memory's map the devious, difficult, but dete.mined pathway of that

progress which your birth-day crowns and celebrates; but your gaze is turned with ardor into the prospect that opens up before you, and we must turn with you, forgetting the things which are behind, and reaching forth unto those things which are before, and press together toward the mark for the prize of our high calling in a very noble profession. When I speak of this day, distinguished by its grand event, as "an high day," a holyday; I mean not that the repose it brings to our solicitude, and the refreshment it ministers to our wonted toil, may rightly diminish devotion to our duty, or afford a furlough from its service, but, in my conception, the occasion has the character of a festival, affording a happy hour of liberated thought and feeling, strongly tempting the fancy to wander at will in the track familiar to the footsteps of those who have made the journey which brings us to this hour of happy consummation. But I am recalled from those pleasant passages of the beaten pathway to stand with you upon the high ground that we have reached, and look around and before us, to leave the route of recollection for the survey of the field we occupy, and the prospect that opens beyond it.

Where stand we, and what lies within the circuit of our vision? One glance at the retrospect, and then let us look steadily at our position and our duties. Twenty-five years ago, dentistry was practiced as a secret art. It neither was, nor pretended to be, a liberal, any more than a learned, profession. Then two or three dentists sufficed for the practice of Boston, an equal number for Philadelphia, and in the same proportion, for New York, and the other Atlantic cities, and the great west and south were served, where they were served at all, by itinerants, whose visits were occasional and accidental, and their benefits, most likely, of much the same character.

A few illustrious instances there were of men of mark, in those early days, like the heroes and prophets of a barbarous age, but their very distinction exposes the poverty of the times in which they flourished. There are no giants in civilization, and geniuses are comparatively rare when culture is general, and the common standard is high. "A commonwealth of

kings" is a better condition than a community of churls, with a prince or two reigning above them, out of the reach of their capacity for anything but wondering worship. Now, distinction is better leveled, and more broadly distributed. Not less than three thousand practitioners occupy the places of the three scores of a quarter of a century ago, and the average capacity of the mass is in at least an equal ratio with the numbers—as much better as they are more numerous.

This for the general comparison and the census of the subject. The specific and distinguishing features have still more value in the estimate.

Fifteen years ago, the first regular dental college in this country, and the world, was established in this city, and already this noble pioneer in classic education is followed by three others favorably situated for the usefulness they aim at, and equally devoted to the best interests of the profession. Fourteen years ago, the American Society of Dental Surgeons was formed, which has been followed by numerous local institutions, and to-day you have founded the new order of Associated Dental Alumni of the nation!

In the mean time, the text books and treatises of the science have grown into an encyclopedia, and our periodicals cover the ground, and supply the current wants, of the profession. This, it seems to me, completes the circuit of institutional agencies, and describes the outline of instrumentalities by which it is to accomplish its educational functions, and achieve its destiny as an independent branch of the healing art.

What a history is this to lie within the compass of half an ordinary life time!

It seems but as yesterday when there were not so many even of the poorest pretenders to our art, as there are to-day accomplished graduates of our colleges!

Judge, then, with what gladness we meet you here, in the character and for the purpose that has assembled you. Imagine the exultation that we feel in these first ripe fruits of the harvest, on which our hopes have hung, and rejoice with us in the confidence which such success inspires, of all we have yet to wish for.

To this point we have arrived. The principles of our art have taken the form of a systematic science, its practice has been brought within rule, a literature, adequate to the exigency, has been established, formal education in its highest style of efficiency is fairly inaugurated, a fraternity of legitimate practitioners is acknowledged, a standard of worth, with accrediting designations, is set up and accepted, all the interests of the profession are embraced and conducted by the highest idea in it, and the methods and means of defence and development are richly possessed, and sufficiently active.

So, the transition age is passed, and the conditions and duties of a new era are upon us; upon *us*, I say, for the men who have lived in these hopes, and labored to these ends, are neither old enough, nor indifferent enough yet, to surrender their interests, or abandon their duty to the times that still lie before and rise above us.

Let us look over into this land of promise, and survey briefly the route of progress into it.

The first measure essential to the advance is, efficient professional organization, with its policy adjusted in every direction to the cultivation of the science, and to the regulation of the conduct of the profession.

This, in one of its departments, you have happily instituted. Your scheme contemplates the gathering into one associated fraternity the graduates of the schools, that you may at once provide for all the interests of your order, and avail yourselves of the help that there is in association for individual advancement, and of its power in forming an authoritative professional sentiment, and through its agency, raising public opinion into a supporting conformity.

You cannot expect too much from such an organization, for it is capable of all the good and more, it may be, than the most sanguine among you hope for; but it must not be forgotten, also, that it may fall below and disappoint even the most moderate calculations that any man who enters it may entertain.

A society may be anything in results, from an honorable as-

sociation, down to a selfish conspiracy; a great good or a great evil; or, it may be a mere nothing—and again, it may be all right in its principles, and yet wholly inefficient in practice.

For what general objects, and in what spirit, should the graduates of dental surgery gather themselves into one great family? In the first place, you have yourselves taken the regular steps for attaining a thorough professional education, you are the first instances and witnesses of the system so lately introduced among us, and it behooves you to vindicate this new movement by demonstrating all those benefits, the expectation of which induced its adoption. You are to show that you have been, not only more regularly, but better, educated than you could have been without the advantages of college training. One of the best proofs of this point which you can give to the world is, an increased and intensified desire for all learning, scientific and practical, that holds any effective relation to your profession. If you make your association serve for mutual help in inquiry and attainment, however slight the actual gain, you will have justified the system of collegiate education triumphantly. Whatever leads to such an effort, and induces such a spirit, fulfils the highest promise of an educational enterprize.

A method of study which teaches its pupils only to think, and inspires a hungering and thirsting for legitimate knowledge, is worthy of all acceptation, even if, directly and immediately, it imparted not a single preceptive or practical truth, if that were not in the nature of the thing, quite impossible. Education, indeed, is not so much that which is put into the mind, as it is that which is evoked or brought out of it. It is not the transfer of the goods of a storehouse of learning to passive recipients, but it is the power of the keys by which aroused intellect may enter all repositories of treasure, and for itself take available possession. A surgeon may show his student how to reduce a fracture, or a dentist may exhibit the method of treating a diseased tooth, but the successful instructor is he who prepares his pupil to grapple with practice, either routine and familiar, or new and unknown, in the spirit, and with the power of a discoverer. Let your association only indicate an insatiate desire to

press forward in professional attainment, and the collegiate system will stand warranted and honored in the judgment of all men.

While you thus exhibit the utility, and carry the issues of the system forward toward their ultimate aim, you are also concerned to assert its dignity and maintain it, not in any spirit of selfishness, exclusiveness, or diplomatic vanity, but to effect a wholesome and necessary reform of the commonly low standard of professional competency.

The honor of the profession is in a distinguished degree in your keeping. First, to be promoted by your own real eminence in all its functions, and next, by the guard you set over its character in the requirements you make as conditions of professional recognition. Quackery is to be discredited as decidedly as legitimate qualification is to be respected and supported. This is difficult and delicate ground, but cannot be dangerous to enlightened and liberal men. Remembering that the very preceptors whom you most honor, were in the profession before a dental college was in existence, you cannot commit the mistake of holding a diploma to be the sole and exclusive evidence of respectability, though it may very properly be the condition of membership in your special association. On the other hand—to the extent that your opinion and influence can affect the system of study of those about to enter the profession, if you are convinced that the collegiate course is to us what it is to the other branches of general medicine, you will not fail to lend all your influence in its favor; and in like degree, and for the like generous and just reasons, discourage and discountenance the usage that undervalues and evades it. The idea and effort which have resulted in the successful establishment of the collegiate method depend upon you for the demonstration of their worth. In scripture language, "wisdom is justified of her children." This duty rests upon you. This responsibility you have incurred, and you can discharge it only by an enlightened devotion to the interests of your own order, and an unselfish exertion of all the power you possess to discharge its duties to the world.

Medical societies, prompted by an absorbing zeal and pride

of caste, are liable to convert themselves into close corporations, to the neglect of those generous obligations which they owe to the world outside of their limits. The regulation of their fee-bill, declamatory denunciation of quackery, fastidiousness in association, and an exacting system of etiquette among themselves, may easily receive more than due attention; and when these are the sole or principal drift of the organization, nobody but the members are concerned in them, and no one else will long respect them.

Giving these things their due and necessary place among your objects, you will nevertheless hold them properly subordinate to the greater aims of your fraternity. The interests of a liberal profession are intrinsically worthy of high and earnest consideration, while kept in harmony with its duties; and they are doubly so, for the reason that its prosperity is an essential condition of its capability for the most generous uses of its existence; but these highest purposes of its being, as they are the ultimate, so they should be the governing aims of all its conduct.

Let us look for a moment at the capabilities of your association to forward its noblest intentions. You have finished the studies of your pupilage, and some of you have already entered upon responsible practice. You are in that stage of professional life that brings the principles of your art to the test of personal experience. The available truth of your teaching, and your own clearness of apprehension, and thoroughness of attainment, are put under trial upon the testimony of practical facts, and before the jury of the country. You are just in the position to need counsel, and in your case it is eminently true that in a multitude of counsellors there is safety. Your society, if nothing else, is a hopeful refuge for the earnest solicitudes of your position, and, it is capable of meeting your necessities in a multitude of particulars.

In the first place, there is a natural tendency to relax theoretical study amid the anxieties and engagements of an opening practice. It is not felt to be a direct means of securing the early success that, for so many good reasons, is desirable. There

are a thousand seductive influences at work, whose tendency is to abate the enthusiasm of professional study, and crowd it out of place. You do well to provide yourselves with counter influences against these diversions of the intellect. The most ardent of you will be helped to effort by the obligation to conventional duties incident to membership. For every one of you some service may be appointed, which will demand the assiduity, and keep up the habit of studious inquiry. You will be living in the presence of your peers, and will feel all the force that there is in laudable ambition to impel, and in respectful but critical expectation to invite you, to creditable exertion.

The regularly recurring assemblages of the society, like mile stones, will indicate the progress of each mind, or like tombstones, mark the loss of growth and vitality, and will press the knowledge and consciousness of his condition upon him, and thus act as provocatives to all that is possible in him. For mere disciplinary purposes, every man of you will find his membership a means of saving grace against all temptations to indolence and delinquency. Whoever knows his own nature best, is most earnest in guarding and strengthening his convictions of duty by every corrective that he can judiciously provide. Task yourselves to your best performances, and give the pains and penalties of opinion the best opportunity for compelling you to obedience. Not one man in a thousand gets all his resources into their best activity without the help of other incitements and responsibilities than those that are entirely within his own government, and liable, therefore, to be dispensed with, under the excuses which only too readily present themselves.

When a man is a whole society himself—president, recording secretary, and treasurer—the pledges he makes to it are far from immutable. When pleasure, profit or idleness interfere, he has nothing to do but call the society together, and postpone, modify, or abolish the pledge, by a unanimous vote. Better let somebody else have a word to say in such meetings for the transaction of business. Better have the exactions of less complying parties to meet, than thus to be at the disposal of

your own caprices. I speak from the experience of one who is conscious of doing his best work of every kind under such compulsions as he would, many a time and oft, have dodged, if the veto power had not been lodged in other hands and heads than those which had the work to do. I need not make more explicit confessions, for I don't want to be personal, but let me whisper in your ears, in a voice that gathers its strength and volume from the cumulative convictions of long years of struggle, and from the earnestness of anxious self-inspection, that the best thing you can do for the usefulness, honor and happiness of your professional lives, is to go into the collar and traces of duty resolutely, and take the checks and whip kindly, in the car of professional progress. I have but little hope of that man paying his debt, who refuses to give his note of hand for it with interest, when it has a long time to run; and I have as little hope of a zealous discharge of duty by that man who does not, at the outset of his career, bind himself to its performance. It is too much like marrying your sweetheart without the vow and the ceremony—too much like entering upon an office without giving the qualifying inaugural oath or affirmation which owns the trust and promises fidelity.

The yoke of a generous public service may not always sit lightly upon a limber neck; but principle and policy alike command its unequivocal and unflinching assumption; *you* are fairly hitched up, see that you run your course under a tight rein and a stiff trace.

But there are other necessities for such associations besides those that act chiefly as incentives to profitable self-discipline. The studies and teachings of pupilage are necessarily restricted, mainly to the elementary learning of the art; but all around the borders and above the level of this fountain of learning are tributary streams of science that must be invited into it by works of self-improvement necessary to keep the reservoir fresh, full, and flowing. The collateral branches of learning which run along the main channel must be explored and drained of their refreshing riches. In the exercises of your society the commonplace and familiar will of course be avoided, and the con-

tributions made and received, will be from those sources that demand a multitude of minds in their multiform variety of fitness, and are just of the character that no single man can accomplish for himself in any tolerable completeness, and which no tolerably complete professional character can spare.

Among a hundred ambitious cultivators of science, not a few will furnish indispensable help to their compatriots; all will reap the benefit, and, what is best of all, the worthiest will be the standard and the stimulus of all. The excellence of such institutions is in their power to induce a noble emulation, and provoke a generous zeal, whose tendency is to level up the whole mass toward the highest in rank of its constituents.

The *esprit du corps* feeds the fire in every bosom, and the habit of effort, while it keeps the aim high, preserves the youthfulness and energy of ambition fresh and glowing.

You will go back to your every-day engagements from these conventions with the life of the whole association glowing in you, and will distribute its impulses all around you. Under these influences that study, which those who study much know best is never done, will happily never stop undone and unendeavored; and the rust of sloth will not be allowed to steal over and eat out the life of your young energies.

I can but hint at those ancillary arts and sciences which may be made richly to contribute to the general improvement of your society, through the diversified capabilities of its large membership; but I will hope that such a hint may sufficiently serve its purpose.

The entire range of general medicine lies within the purview of your own professienal studies. No man engaged in any one branch of curative practice can cultivate every kindred branch to the entire available value of all the treasures which it holds in waiting or his use. No book, or number of books, and no course of professional lectures upon our speciality, comprehends the full breadth and depth of these vast reserves of kindred knowledge. Such completeness, perhaps, cannot be affirmed, as yet, of any department of medicine; but ours is still too young, too immature, to have nearly reached the symmetry and stature

which the rich materials, ready and offering themselves for our use, are waiting to bestow upon it. This way lies your path; these fields are ripe for your reaping; their harvest is for your gathering, winnowing and storing, in the seminaries of our science.

The systematic principles of the parent profession, and its remedial means and methods, all have references available and essential to our art; but it rests upon us to give them adjustment to our own uses. The teachers of medicine and surgery know nothing of dentistry, and are utterly incapable of providing for its growth, or directing the manner of its development. Their science abounds with material for the edification of ours; but that law which rules the assimilative processes of the living body, obtains with like force in the several professions concerned with its constitution and charged with its health. Each member, each separate organ, appreciates and appropriates, from the common vital current that flows through them all, those elements of life and growth which it specially requires. The figure, which is also, in the strictest sense, the fact, teaches you that *you* must select, secrete and elaborate your own vitality from the current life-blood of the general healing art.

In the exercises of your society, its essays, reports and debates, room and requirement will be present for turning all the streams of medical and surgical science into the channel of our progress. One in physiology, another in histological anatomy, a third in the principles of surgery, a fourth in pathology, a fifth in materia medica, a sixth in practice, prophylactic and therapeutic, a seventh in chemistry as applied to the art—each will bring its contribution—each his revelation, while others will interpret, and all will profit in their special provinces of practice and speculation; and thus, in the happily descriptive language of the Apostle to the Ephesians, which has all the exactitude of a scientific statement of the vital functions of circulation and assimilation, "the whole body fitly joined together and compacted by that which every joint supplieth, according to the effectual working in the measure of every part, maketh increase of the body unto the edifying of itself in love."

But when all the branches of technical medicine are thus explored and their contributions received, the relations and dependencies of your art are not yet all included. Natural history and comparative anatomy are rich in material and abundant in suggestion for your service, as a glance at Agassiz' Principles of Zoology, or the Odontography of Owen, the former in a small popular treatise, the last in two volumes, with 168 plates, (exclusively of the teeth of the vertebrate animals,) will abundantly demonstrate.

Metallurgic and mechanical science are mines of wealth to the dentist, to be smelted and moulded into useful application, by the labors of those who have the special qualification, taste and favoring conditions for the work; and Mechanism and Manipulation open spheres of discovery and improvement for other useful modifications of individual talent. And finally, for I must close this rapid and sketchy enumeration; Esthetical principles and art have a commanding worth among the researches that invite your zealous devotion; and Physiognomy, a mere play of curious speculation to the disciples of other spheres of useful learning, becomes a practical requirement of yours.

If the Painter is concerned with color, light and shade, and their correspondences; and the Statúary, with form and symmetry, and their significance, you, as much as either, or both, require the nicest perceptions and exactest adjustments of these elements of expression in the perfection of your work.

In all these varied departments of science—in all this large range of practical and imitative art, dentistry is deeply involved, and it is in the programme of your duties to develop all they have of use and beauty, and incorporate it into the system and service of our art.

The necessity for a wide distribution of functions, and a close combination of effort, needs no argument after a survey of the multiform requirements that are to be met. The interlinking and dependency, the reciprocal exchange of service, and the mutuality of stimulation to exertion, which your organization provides for, stands clearly demonstrated in the light of a fair apprehension of our profession's conditions, demands and destiny.

By all that your predecessors have achieved, which is at once your inheritance and debt—by all the toils and hopes and triumphs embodied in the progress that has been attained—by all the prophecies springing from the success realized—by all the trust implied in the stewardship committed to your hands—by the hopefulness of your own ambition, and the duties that you owe to your brethren and the world—you are commissioned and commanded to a worthy performance of your work.

Your diplomas do not mean that your studies are finished and your attainments completed; your preceptors do not dream that their teachings reach the natural limits, or cover, or complete, the boundaries of our broad field of professional learning. The past was theirs, but the future is yours, and we look to you to make that future worthy of that past, by the distance in excellence which your achievements shall put betwen them.

But your commitments and obligations follow you from your conventional and fraternal intercourse with each other into the relations of private professional life, and the same spirit requires conformable conduct there. The recruits, series after series, that are to be your compatriots first, and afterwards your successors, come fairly within your responsibilities. The system of private tuition which will be largely in your hands or otherwise under your influence, is one of the weightiest duties, and one of the worthiest, you are about to assume. Look well to the preparatory education, the personal qualities, the morals and the habits, of those whom you admit to the opportunities of your tutorship. And then, under the most solemn obligations of honor and conscience, and with the strictest fidelity to them and to the profession, do your whole duty to them. See that their studies are systematic, liberal and thorough. Let neither the interests of business, nor the selfishness or indolence that tempt, nor the difficulties that embarrass, hinder you from preparing them for the best reception of their subsequent collegiate instruction. The utmost fidelity of the colleges in the discharge of their functions will fail of its highest aims, if you send them unworthy, incapable, or undisciplined subjects for their teachings. Allow me to say, moreover, that a general

elevation and improvement of the system of private study will re-act with prodigious force upon the Faculties of our colleges, and push them also up toward a higher grade and style of education; not only by the relief it will afford them from the labor of horn-book instruction, but by the force of that criticism with which it will qualify their classes. Bear constantly in mind that you are the educators of the future profession in as absolute, if less obvious degree, as those who put their names to your diplomas. Out of the faithful exercise of this power which is in your hands, we trust, will speedily arise a greatly enhanced requirement in the educational customs of the country, and under its influence, quackery will rapidly go down, and the usefulness and honor of the profession as rapidly rise to their natural rank in liberal learning.

What more shall I add? how else or better can I enforce the just requisitions of the profession, of the world, and of the future upon you? The topics are not exhausted, for they are exhaustless, nor the solicitudes satisfied, for they are importunate, and without limit, as their objects are lofty and holy.

But your own ambition, your attitude and commitments, are a sufficient assurance. You have taken your advanced position resolutely. In the spirit of professional chivalry you have taken upon you the high adventure, and will not fail of the achievement.

We commend and commit you to your task, and, with our heartiest and hopefullest words of cheer, trust you for the issue

ARTICLE VI.

A Dissertation on the Diseases of the Dental Pulp and their Treatment, prepared at the request of, and Read before, the ASSOCIATED ALUMNI OF AMERICAN DENTAL COLLEGES, at a Meeting held at the BALTIMORE COLLEGE OF DENTAL SURGERY, March 2, 1854. By CHAPIN A. HARRIS, M. D., D. D. S.

THE pulp of a tooth, from the high degree of vitality with which it is endowed, is one of the most sensitive structures of the body, and like other parts, is liable to become the seat of various morbid phenomena. Its susceptibility, too, to morbid impressions, is influenced by a variety of circumstances, such as temperament, habit of body, the state of the constitutional health, the condition of the hard structures of the tooth, &c. A cause which, under some circumstances, would not be productive of the slightest disturbance, might, under others, give rise to active inflammation, together with all its painful and disagreeable concomitants. Increased irritability may exist independently of any organic change, either in the pulp, dentine, or enamel. Examples of this are often met with in females during gestation; but it arises more frequently as a consequence of caries of the tooth than from any other cause. Even before the disease has penetrated to the central chamber of the organ, the pulp, either from functional disturbance arising from decomposition of the dentine, impaired relationship between the two, or from being more exposed to the action of external deleterions agents, often assumes a most wonderful and marked increase of irritability. Impaired digestion, as well as a disordered state of other functions of the body, frequently produces the same effect.

The susceptibility of the pulp to impressions of heat and cold and of acids, is always increased by heightened irritability. When this exists to any considerable degree, the mere contact

of these agents with the tooth, is often productive of severe pain, which, on their removal, usually, very soon subsides. The pulp, however, may remain in this condition for months, and even years, without becoming the seat of inflammatory action.

Preternatural sensibility of the dentine,* whether in a sound or partially decomposed state, augments very appreciably, the irritability of the pulp. Impressions of heat and cold conveyed through the conducting medium of a metallic filling, or of a thin covering of dentine, as sometimes happens when a considerable portion of the tooth has been worn away, is also a very frequent cause of heightened irritability of the pulp. With its susceptibility thus increased, the impressions produced by these agents are often a source of irritation, and even of inflammation and suppuration, causing the death of the entire crown and inner walls of the root of the tooth. At other times, the irritation is only followed by a slight increase of vascular action and an effusion of plastic lymph over the affected part of the pulp, which is gradually converted, first into *callus* and then into *bone;* thus an additional barrier is interposed between it and the irritating agents.

The entire pulp, when the irritation, instead of being confined to the portion of its surface first affected by the irritating agent, extends to every part of it, sometimes undergoes ossification, or rather, is converted into *osteo-dentine.* The effusion of lymph, and its conversion into callus and bone is an operation which, until recently, was supposed to be wholly confined to true osseous structure, and although some one or two examples are on record, in which something very analogous to it had taken place, the occurrence was regarded rather as an accidental circumstance—as an exception to the rule, and not as the result of an established law of the economy. One of the cases

*The sensibility of dentine is sometimes so much increased that the mere contact of a hard substance with a part which has become exposed by the destruction of a portion of the enamel, is often productive of severe pain. Examples of this sort are often met with in teeth affected with caries, before the animal frame-work has suffered complete disorganization, the earthy salts only having been decomposed—thus showing that vitality often continues long after the commencement of the disorganizing process of the disease.

to which I refer is described by Dr. E. Baker, of New York, in the first volume of the American Journal of Dental Science. It consists in the union of the fractured extremities of a central incisor of the upper jaw, broken at the neck—the crown forming a right angle with the root, it having, by the accident, which occurred at about the eighth year of age, been thrown back towards the roof of the mouth, in which position it had been permitted to remain until an ossified union, so to speak, had taken place.

Now, it is evident from the appearance of the tooth, as shown by the engraving accompanying the description, that ossification of the elongated portion of the pulp had only proceeded far enough for the formation of two or three concentric layers of dentine around its peripheral surface, and although these were fractured, the crown of the tooth was retained in its abnormal position, doubtless, by the remainder of the pulp, which could not have been severed. The deposition of earthy salts, therefore, was still carried on, and the solidification of the remaining portion, while bent to a right angle, would account for the relationship maintained between the two parts of the tooth. If its investing membrane were not actually ruptured, it must have sustained some injury when the dentine, already formed, was fractured. Inflammation must have supervened, but this, as would seem from the appearance of the engraving, only caused an effusion of lymph, which, by its conversion into callus and osseous tissue, served to complete the reparative operation. Whether an *actual* union took place between this new formed tooth-substance and the fractured edges of the dentine, I am unable to say, not having had an opportunity of examining the tooth. The reproductive manifestation, however, evidently came from the pulp—not from the dentine—and I have referred to the case for the purpose of showing that this tissue, under certain circumstances, and to a certain extent, is endowed with regenerative attributes.

The first example of an effort at reproduction of tooth-substance to which my attention was particularly called, occurred about four years ago, in a tooth into which I had placed, some

months before, a temporary filling. The pulp, at the time, was considerably exposed, and, fearing an unfavorable result, I introduced, after having removed the decayed parts, a filling of Hill's stopping, leaving a small vacant space at the bottom of the cavity. On removing the filling, I perceived a white protuberance occupying the place of the vacant space which had been left at the bottom of the cavity, and which, on being touched with a sharp-pointed instrument, was found to be of about the consistence of cartilage. The question, whence did this come or how was it formed? immediately suggested itself, but it was not until I had observed the same thing in several other teeth, and ascertained that it ultimately ossified, that I arrived at the conclusion that it was callus, formed from coagulable lymph, effused from the exposed surface of the pulp.

This fact being established, the conclusion seems irresistible, that nature, under certain circumstances, employs the same means for the reparation of injury here, that she does in other osseous structures of the body—the only difference being, that the lymph in the one case is effused from the lining membrane or pulp of a tooth, while in the other it is poured out from the vessels of the periosteum and fractured surfaces of a broken bone.

With these few preliminary remarks, I shall proceed to notice, first, irritation of the dental pulp.

Irritation.—The pulp of a tooth may become the seat of severe pain when there is no inflammation in it. The slightest increase of vascular action, when this organ is in a preternaturally irritable condition, is productive of more or less irritation. The pressure of the slightly distended vessels upon the nervous filaments distributed upon it, at such times, is sufficient to cause great pain.

Impressions of heat and cold are conveyed more readily to the pulp when the dentine is in a morbidly sensitive condition, and when this is the case they produce a more powerful effect.

The remedial indications for pain in a tooth arising simply from irritation of the pulp, consist in the removal of the primary and exciting causes. When produced by impressions of heat and cold conveyed to it through the conducting medium of

a metallic filling, and intervening supersensitive dentine, the filling, if the severity and continuance of the pain is such as to warrant the belief that it will give rise to inflammation, should be removed and some non-conducting substance placed in the bottom of the cavity previously to replacing it. If this is done before inflammation actually takes place, it will prevent subsequent irritation from these causes. It is worthy of remark, however, that the pain thus produced, is in proportion to the sensibility of the subjacent dentine. If this is destroped previously to filling the tooth, their action upon the pulp will be as effectually prevented as by the interposition of a non-conducting substance. But in the application of agents for this purpose, there is danger of destroying the vitality of the pulp. The employment of them, however, is resorted to more frequently to prevent pain during the removal of caries than subsequent irritation from impressions of heat and cold.

Arsenious acid, cobalt, chloride of zinc, and the actual cautery have all been employed in the treatmcnt of sensitive dentine, and as there is some diversity of opinion with regard to their relative efficiency as well as safety, a few remarks upon each will not be deemed irrelevant.

The use of arsenious acid for the destruction of the vitality of the pulp of a tooth was first brought to the notice of the dental profession generally by Dr. S. Spooner, of New York, in 1836, but it had been previously employed for three or four years by his brother, Dr. J. R. Spooner, of Montreal. The promulgation of the discovery brought it almost immediately into general use. It was eagerly seized upon by the ignorant and unscrupulous, with a view to individual notoriety, and for several years almost every newspaper contained the advertisement of some pseudo-dentist, proposing to cure every form and variety of tooth-ache, in an almost incredibly short time. So *indiscriminately* and *injudiciously* was it used, that the benefit derived from it was more than counterbalanced by the evil that resulted from its employment. It was applied indiscriminately to teeth in which the lining membrane was exposed, and as soon as it had destroyed the vitality of the

pulp, the decomposed dentine was partially or wholly removed, and the cavity in the crown filled without taking away the disorganized pulp of the central chamber and root. As might have been supposed, the putrid matter here, soon caused irritation and inflammation of the alveolo-dental periosteum at the extremity of the root, which ultimately terminated in the formation of abscess. A result so unexpected, and fraught with consequences so deleterious to the teeth to which the potent agent was applied, as well as to the contiguous parts, caused the more prudent members of the profession either to abandon its use altogether or to endeavor to ascertain if the morbid effects to which it gave rise, were not dependent upon something else than the mere destruction of the vitality of the pulp, and consequent death of the crown and inner walls of the root of the tooth. That they were, seemed to be rendered probable by the fact that in those cases where the pulp had been destroyed and removed by mechanical means, they were rarely developed.

Some supposed that the action of the arsenic extended beyond the extremity of the root and so impaired the vital functions of the peridental membrane, as to prevent it from furnishing the necessary supply of nutrition and living principle to the peripheral walls of the root; in consequence of which, the tooth, to some extent, at least, became a foreign body, and, acting as an irritant, gave rise to the morbid effects which followed. In this opinion, I at first participated, but subsequently, in a conversation with Dr. Maynard, this gentleman expressed to me the belief that they were dependent upon irritation produced by the disorganized matter contained in the central chamber of the tooth, and that by removing the pulp after destroying its vitality, and filling this, to the extremity of the root, they would, in a large majority of the cases, be prevented. He had at this time made the experiment in a number of cases, and the result thus far had proved highly satisfactory. It is scarcely necessary to say that the correctness of the opinion of this eminent practitioner is now very generally admitted.

But the use of arsenious acid in dental practice has not been wholly confined to the destruction of the vitality of the pulp.

It was soon ascertained that the application of it to dentine would destroy its sensibility, and thus enable the operator to remove the semi-decomposed parts of a sensitive carious tooth preparatory to filling, without pain. In employing it for this purpose, however, great care is necessary to prevent the destruction of the vitality of the pulp, and the injection of the vessels of the dentine with red blood. This is very liable to happen when it is applied to a tooth of a very soft texture, especially if in the mouth of a very young person, and when the caries extends nearly to the pulp-cavity. The action of the arsenic, through the intervening hard structures, on the pulp, would seem, in the first instance, to cause, in some way or other, the decomposition of the red globules of the blood, whereby a pinkish-purple tinge is imparted to the serous portion of this fluid, which is conveyed to every part of the dentine. It seems, too, to exert some peculiar action upon the microscopic vessels of this tissue, for the fluid which they circulate is now evidently every where effused from their coats and brought in direct contact with the earthy salts, coloring them so deeply as to im-impart to the crown of the tooth a pinkish or purple hue, which may be distinctly seen through the translucent enamel covering. Three or four cases in which this has happened have occurred in my own practice, one of which I will describe.

Soon after my attention was first called to the use of arsenic in dental practice, a young lady, about fifteen years of age, applied to me to fill an upper central incisor, which, being so exceedingly sensitive as to render the removal of the decayed part almost insupportable, it occurred to me that the morbid sensibility might be removed by an application of this potent agent, having already employed it successfully several times for the destruction of the vitality of the pulps of teeth. I accordingly applied the twentieth part of a grain on a little raw cotton, previously moistened with water, closing the orifice of the cavity with yellow wax, to exclude the secretions of the mouth. My patient was now dismissed, but returned, agreeable to my request, at the expiration of four hours, when I removed the arsenic, completed the preparation of the cavity and filled the tooth.

At the expiration of about a week my patient called on me again, greatly distressed at the change which had taken place in the appearance of her tooth, every part of the crown of which had assumed a pinkish-purple hue. At first, I was disposed to believe that this peculiar appearance arose from congestion of the pulp or from sanguineous effusion from its vascular capillaries, but on removing the filling, I perceived that a reddish brown tinge had, in some way or other, been imparted to the dentine, and on perforating the floor of the cavity, the pulp, to my great astonishment, was found to have lost all vitality, and to have assumed a dark brown or purple color.

At the first meeting of the American Society of Dental Surgeons, held in the city of New York, July, 1840, I took occasion to refer to this, and some one or two other cases, in which the same effect had resulted from its application to sensitive dentine. Dr. H. H. Hayden, and, if I mistake not, some one or two others present, stated that the same thing had occurred in their practice. In a subsequent conversation with Dr. H. upon the subject, the question as to the manner in which this most singular effect was produced, having been started, I expressed the belief that it was brought about in the manner as already described. The teeth of persons who have been drowned or died of cholera or from strangulation, often present precisely the same appearance. From this, it would seem that the sudden exclusion of atmospheric air from the lungs, had the effect of causing the disintegration of the red globules of the blood, before the heart and arteries ceased to act, and hence the injection of the minute vessels of the dentine with red fluid.

But the application of arsenic to a tooth is not necessarily followed by this effect. It is only in young persons, and in teeth of a very soft texture, that it is liable to be produced, unless it is permitted to remain in the tooth a long time. When it is used merely for the purpose of destroying the vitality of the surface of the dentine at the bottom of the cavity, preparatory to the introduction of a filling, and to prevent irritation of the pulp from impressions of heat and cold, it should

never be permitted to remain more than two hours. At the expiration of this time it should be removed, and after thoroughly washing and drying the cavity, the filling may be introduced, without danger of subsequent irritation of the pulp or discoloration of the tooth. The thirtieth, fortieth, or even fiftieth part of a grain, with an equal quantity of sulphate of morphia, is sufficient to apply to a single tooth. It should be placed directly upon the bottom of the cavity, on a dossil of raw cotton or lint, moistened with water or creosote. Some prefer the latter, when the arsenic is to be applied to the pulp, but I have never been able to perceive that it possessed any advantage over the former. After the arsenic has been applied, the cavity should be carefully filled with wax, mastic, or Hill's stopping, to prevent the possibility of its escaping into the mouth and to exclude the buccal fluids. When the cavity is in the approximal surface of the tooth, additional security may be obtained by passing a ligature of floss silk three or four times around it and tying. A small ring cut from the end of a tube of caoutchouc placed on the tooth is even better than a ligature of silk. Some precaution of this kind should be used when the arsenic is applied for the destruction of the pulp, and is to remain in the tooth over night.

Professor Arthur recommends the use of cobalt for destroying morbid sensibility of dentine. He has used it for several years and believes it to be as certain in its effects as arsenious acid and less liable to injure the pulp of the tooth. It is the arsenic, however, with which the cobalt is combined that produces the effect, but Professor A. is of the opinion its union with this, renders it less liable to be taken into the dentine by absorption, and as a consequence, less liable to produce a deleterious action upon the pulp. It is used in the form of a brownish-black oxyd, reduced to a fine powder, and applied to the tooth in the same manner as arsenious acid.

From the few experiments which I have made with it, I have not been able to discover that it possesses any advantages over arsenious acid or that it is less liable to exert a deleterious effect on the dental pulp. The only difference which I have

been able to perceive, is, that the former acts less promptly than the latter. But as I have seldom used either for the last five or six years for the destruction of morbid sensibility in dentine, I am not as competent to judge of the relative merits of the two agents as I should have been if I had had more experience in the use of the former.

For the destruction merely of morbid sensibility of the solid structures of a tooth, chloride of zinc, according to my experience, although somewhat less certain in its effects, is superior to any preparation dependent for its active properties upon the presence of arsenic. With this agent it rarely happens that more than five minutes are required to obtain the desired effect. Although a powerful escharotic, it does not, as all arsenical preparations are liable to do, produce any deleterious effect on the pulp of the tooth. When first applied it excites a sensation of heat, followed by burning pain, but these soon subside, and on removing it from the tooth, the parts of the cavity with which it was in contact, will, in a large majority of the cases, be found totally insensible to the touch of an instrument. Dr. F. N. Seaburg, in the Dental Times, relates a case in which he applied it directly to the exposed pulp of an aching tooth. The pain, which, at first, was increased, soon subsided, and after removing the chloride, the tooth was filled in the usual way with no inconvenience to the patient.

The chloride may be applied directly to the cavity of a sensitive tooth, without being combined with any other substance, on a little raw cotton or lint, or it may be made into a paste by mixing it with an equal quantity of flour, the moisture which it absorbs from the atmosphere being sufficient for the formation of the paste, or it may be mixed with a little pure anhydrous sulphate of lime in an impalpable powder, and then applied to the tooth. But before this is done as much of the decomposed dentine as possible should be removed, and the application should be held firmly in contact with the part of the cavity upon which it is desired that it should act. This may be done by filling the cavity after it has been put in, with softened wax or raw cotton. The chloride may remain in the tooth from five to

ten minutes, or until the burning sensation produced by it ceases. A single application will generally suffice to destroy the sensibility of the walls of the cavity to a sufficient depth to enable the operator to remove any remaining portions of decayed dentine without pain, and to obtund the vitality of the floor at the bottom so much as to prevent the transmission of impressions of heat and cold to the pulp. A second, and even a third application, however, will sometimes be required.

In all the cases in which I have used this agent, it has only failed in one instance to produce the desired effect, but as I rarely find it necessary to make any application to a tooth for the purpose of destroying morbid sensibility in partially decomposed dentine, previously to removing it, and as I prefer, for the prevention of irritation of the pulp from impressions of heat and cold, placing a non-conducting substance on the bottom of the cavity, before introducing the filling, I have not used it very often. Even in the cases in which I did employ it, I was induced to do so more as a matter of experiment than from any practical advantage I hoped to derive from it.

The actual cautery was at one time much used and highly recommended by French dentists, in the treatment of sensitive decayed teeth, but the use of it was long since laid aside by American and English practitioners, as the application of it gave rise, very often, to inflammation of the pulp.

Less potent agents, such as pulverised galls, tannic acid, &c., have been employed for the purpose of destroying morbid sensibility in teeth preparatory to filling, and very often with the most gratifying results.

Having noticed the agents usually employed for destroying morbid sensibility in dentine as a means of preventing irritation, from impressions of heat and cold, of the dental pulp, I will proceed to notice a few of the non-conductors of caloric that have been used for the accomplishment of the same object. Among the substances which have been employed for this purpose, are, *asbestos*, *gutta percha*, *Hill's stopping*, which is a compound of gutta percha, carbonate of lime and some other earthy salts, *cork* and *oiled silk*.

Asbestos—one of the best known non-conductors of caloric capable of being applied to this purpose, was first brought to the notice of the dental profession by Dr. Solyman Brown, in a paper published in the American Journal of Dental Science in 1840. At the time this article was written, the author did not claim that a sufficient number of experiments had been made with asbestos to warrant the positive assertion that its use would become general among dentists. He however thought that enough had been ascertained from the experiments which had then been made with it to render it highly probable that this would be the case, and I have no doubt that his prediction would have been verified, if another non-conducting substance, at that time unknown, which can be more conveniently applied to the cavity of a tooth, had not subsequently been discovered. As it is, it has been employed in a sufficient number of cases, to establish the fact, that the object proposed by Dr. B. can be accomplished by its use. As a non-conductor of caloric, it certainly possesses every desirable property, and it is as indestructible in a tooth as gold.

When used for this purpose, the purest variety of asbestos should be selected. A small pellet, made from the filaments of this mineral, placed in the bottom of a cavity in a tooth previously to the introduction of the gold, will effectually prevent irritation of the pulp from impressions of heat and cold. The cavity, however, should be first properly prepared, washed with tepid water and made perfectly dry. The asbestos may occupy from one-fourth to one-sixth of the depth of the cavity after the filling has been introduced and consolidated.

Within the last few years the concrete juice of a plant supposed to belong to the natural order *sapoteæ*, called *gutta percha*, and somewhat similar to caoutchouc, possessing great tenacity, and but little elasticity, has been introduced to the notice of the dental profession. At a temperature of fifty degrees, Fahrenheit's scale, it possesses the density of wood, but at one hundred and fifty, it is plastic, and may be used for taking impressions of the mouth or be moulded into any desired shape. It is soluble in chloroform, but insoluble in the secretions of the mouth.

Soon after I became acquainted with the properties of this article, I applied a drop or two of a solution of it in chloroform to the exposed pulp of a tooth which I was about to fill. The chloroform evaporated almost immediately, leaving a thin pellicle of gutta percha on the bottom of the cavity. This experiment was repeated a number of times, and soon after, I applied it to the bottom of cavities in teeth where the dentine was so sensitive as to lead to the apprehension of irritation and inflammation from the transmission of impressions of heat and cold.

The result of these last experiments was so satisfactory, that I took occasion, at a meeting of the American Society of Dental Surgeons, held at Saratoga, in 1848, to call the attention of the members to the subject. But previously to this time, Dr. A. Hill, of Norwalk, Ct., had made a preparation, now generally known as "*Hill's stopping*," of which gutta percha forms the principal ingredient, for filling temporary teeth, and permanent teeth in cases where the sensibility of the dentine is such as to preclude the use of gold or other metallic substances. He gave me a small piece, requesting that I would make such experiments with it as I might deem necessary to satisfy myself with regard to its value. It proved more valuable than I expected, for it soon occurred to me that a thin layer of this preparation placed on the bottom of the cavity of a tooth in which the dentine was in a supersensitive condition, previously to putting in the gold, would, on account of its non-conducting properties, prevent impressions of heat and cold from being conveyed to the pulp, and as a consequence, the irritation liable to be produced by them. The result fully equalled my expectations, and I have continued to use it in cases of this sort, with the most decided advantage. It answers equally as good a purpose as asbestos, and can be applied more conveniently. It also adapts itself more perfectly to the inequalities of the floor of the cavity.

The method of applying it is very simple. The cavity being first properly prepared, a small piece of this preparation is slightly warmed by a fire, or by the flame of a candle or lamp, then placed in the bottom of the cavity and adapted to its ine-

qualities by pressing on it gently with a large broad-pointed plugger. This done, the cavity may be filled with gold in the usual manner.

Dr. J. H. Foster, of New York, adopts a somewhat different method of procedure in the use of this compound. He first makes a cap of gold plate, fitting it accurately to the walls of the cavity. He then fills the concave part of it with this preparation, then places it in the bottom of the cavity with the convex side looking towards the orifice, and afterwards fills the tooth in the usual way. His object in using the cap is to prevent depressing the floor of the cavity upon the pulp, which, in those cases where it is very thin, is liable to be done, unless great precaution is used in introducing the gold. When this happens, irritation and inflammation follows as a natural consequence, and the only means of affording relief in such cases, consist in the removal of the filling, and this, unless had recourse to before inflammation takes place, will prove unavailing. When, therefore, there is reason to apprehend an occurrence of this kind, the gold should be pressed so firmly against the walls of the cavity, when it is introduced, as to prevent the possibility of depressing the bottom of the cavity in the subsequent consolidating process of the extruding portion of the metal. The solidity and permanency of the filling will, of course, depend in a great degree, upon the faithfulness with which the first part of the operation is performed.

When the depth of the cavity in the tooth is sufficient to admit of the introduction of a gold cap, as recommended by Dr. Foster, without interfering with the subsequent operation of filling, there can be no possible objection to its use. Thus protected, it would be almost impossible to depress the floor of the cavity by any amount of force which might afterwards be employed in introducing and consolidating the gold. I have not, however, found it necessary, even in cases where the pulp of the tooth was actually exposed, to use it.

Cork, though an equally good non-conductor of caloric, is thought by some, as it is of a more destructible nature than asbestos or gutta percha, to be objectionable, but cut off as it

necessarily would be in the bottom of the cavity beneath the filling, its liability to undergo any change, would seem to be rendered wholly impossible. The only valid objection, it seems to me, that can be urged againt its use, is, that it is of a more porous nature than gutta percha and cannot be adapted as perfectly to the inequalities of the floor of the cavity. In consequence of the former of these objections, there is danger in introducing the filling of forcing some portions of the gold through it, unless a very thick piece be used. Oiled silk has been used in some cases very successfully, but is not as good a non-conductor as any of the before mentioned agents.

As a means of preventing irritation and inflammation of the pulp, from impressions of heat and cold transmitted to it through the conducting medium of a metallic filling, introduced after this organ has become exposed, Dr. S. P. Hullihen described to me in 1850, an operation which he had invented some time before, consisting in perforating the root to the central cavity with a small drill, first passed through the edge of the gum and alveolus, thus making an outlet for the escape of effused fluids and the blood which may be poured out from the vessels punctured by the point of the instrument. The operation, in the hands of Dr. H. and a few others who have practiced it, is said to have been very successful, but not having had occasion to perform it more than three or four times, since it was first made known to me, I am not able to speak from personal experience of its merits.

But a metallic filling is not the only medium through which impressions of heat and cold are conveyed to the dental pulp. When the dentine on the coronal extremity or side of a tooth becomes very thin from loss of substance, occasioned either by mechanical or spontaneous abrasion, the use of the file, erosion, or other cause, the pulp sometimes becomes painfully affected by the action of these agents. Loss of substance from any of these causes, is also often attended by exalted sensibility of the exposed dentine; and when this is the case, the contact of acids with it is productive of more or less pain. Nature, however, usually employs means to prevent the painful conse-

quences that would naturally arise from continued abrasion of the coronal ends of the teeth and the consequent exposure of their nervous pulps, which consists in the gradual ossification of these organs, so that by the time they would have become exposed, they are converted into bone, or osteo-dentine. But this does not always take place in time to prevent irritation and pain; and when it does not, some practitioners recommend, where the loss of substance is confined to the molars and bicuspids, the application of caps to the crowns of such teeth as have suffered most. The secretions of the mouth, however, that would necessarily accumulate between them and the teeth, would soon become vitiated and increase the already existing sensibility of the exposed dentine. The difficulty, therefore, would be greatly aggravated by appliances of this sort. The inconvenience and suffering which sometimes arises from the wearing away of the teeth, can only be prevented by avoiding the use of acids, and hot and cold beverages; and the observance even, of these precautionary measures, will not always wholly prevent their occurrence.

When irritation of the pulp occurs in a tooth that has been filed on one or both sides, so much so as to leave only a thin covering of dentine, the best known means of preventing morbid sensibility of this, is, to keep the filed surface constantly clean by frequent friction, both with a brush and waxed floss silk, or some other suitable substance. This operation should be repeated after each meal, and in the morning immediately after rising, and at night before going to bed.

When caries has extended to the central cavity, irritation is often produced by contact of partially decomposed portions of dentine or other foreign matter with the pulp. The proper remedial indication in such cases, it is scarcely necessary to say, consists in the removal of whatever matter from the tooth that can act either as mechanical or chemical irritants. This done, the cavity in the tooth—supposing the pulp to be in a healthy condition—should be properly filled.

But, when the irritation arises as a consequence of exalted irritability and increased vascular action of the pulp, dependent

upon disease or altered function of some other part or parts of the body, the remedial indications are different. The treatment, then, should be addressed to the primary affection. Examples of this sort are of frequent occurrence. They are met with almost daily, particularly in females during gestation, and in dyspeptic individuals, and persons affected with gout and chronic rheumatism. They are also sometimes met with in individuals who have been exposed to miasmatic emanations of marshy districts, when the irritation assumes an intermittent form, occurring at stated intervals, of twenty-four, forty-eight or seventy-two hours, and continuing from one to three hours. Some of the worst forms of tooth-ache are produced by one or other of these causes.

The local disturbance, when it occurs in females during pregnancy, may generally be removed by mild aperients, and by warm foot-bath and anodynes at night on going to bed. When it depends upon other kinds of derangement of the uterine organs, treatment suited to the peculiar indications of the case should be instituted. When it occurs in a person affected with dyspepsia, rheumatism or gout, the constitutional treatment required by the particular disease, constitutes the proper remedial indication. When the irritation assumes an intermittent form, an emetic or cathartic, followed by quinine, will generally put a stop to the local disturbance, provided it has no connection with caries of the crown of the tooth.

But the pulp of a tooth is not only liable to *irritation*, but also to *inflammation* and a variety of other morbid phenomena. Endowed as this organ is, with the most exquisite sensibility, it is keenly susceptible to the action of irritating agents of almost every kind, and, therefore, it is not to be wondered that it should become the seat of some of the most aggravated and painful forms of disease.

Having described some of the principal causes and treatment of irritation, I shall next proceed to offer a few remarks on inflammation.

[To be continued.]

ARTICLE VII.

An Essay on the Structure and Development of the Dental Tissues: Presented to the Faculty of the BALTIMORE COLLEGE OF DENTAL SURGERY, FOR THE DEGREE OF DOCTOR OF DENTAL SURGERY, *March 1st*, 1854. By WM. T. RUSSEL, M. D., Canandaigua, New York.

WE propose, in this essay, to treat of the minute structure and development of the dental tissues—a subject which, even to this time, is involved in much obscurity. Our work, however, has been to set forth the main facts, free and isolated from their collaterals, which modern investigations have brought to knowledge, rather than to discuss the various hypotheses and theories that have been originated for their explanation.

Anatomy is, at all times, a demonstrative science, the great truths of which depend for their elucidation upon the revelations of the scalpel and microscope. Abstract and speculative reasonings can be of no avail, other than to assist in the interpretation of what may come within the field of vision; for, as it seems to us, much of *the mysterious* that prevailed in the sciences in former times, and to a great extent in our day, arises from the prurient desire on the part of some observers, to theorise instead of abiding time, and permitting "facts to speak for themselves," as made known.

Aiming to set forth ultimate truths, we have been obliged, necessarily, to confront a vast mass of diverse, and too often opposite opinions and observations; and here, always concisely as possible, we have stated each author's conclusions, without comment, to be confirmed or disproved by future investigations.

Nor is it without some degree of diffidence that we present this undertaking, fearing lest we may not have given that important consideration to certain views which they demand, or that our descriptions have not been sufficiently marked to portray the exact lineaments of the subject: but in reference to the

one, we may recall to the minds of the learned, that much diversity of opinion among the great pioneers of dental microscopy exists in regard to the dental tissues; and as to the other, it is evidently impracticable to introduce in this place such plates and figures as may be necessary to illustrate the descriptions. It will be perceived, however, that we have made proper references, and in all cases "rendered honor to whom honor is due."

The Structure and Development of Dental Tissues.—The tissues that compose a tooth, are: the dentine, the enamel, the crusta-petrosa, or cementum, and the pulp.

Dentine was at one time supposed to be bone; but modern investigations go to show that it differs from that substance in its mode of formation, structure, and chemical composition, and, therefore, is entitled to a distinct rank among the other tissues of the body. It is the most internal of the hard structures of a human tooth, and composes the chief bulk of its body and root, and also gives to the organ its particular shape and density. In its centre is the pulp cavity, which, extending through the root and most of the body, opens externally at the apex of the former by a single aperture.

The *enamel* placed upon, and external to the dentine, covers the whole crown of a tooth after the manner of a cap. It is thickest upon the cusp, and gradually becomes thin on the sides, and toward the neck. This substance is by far the hardest of organized structures, and to such a degree is it possessed of this property, by which alone it is so beautifully adapted to its ultimate purposes of comminution and attrition, that finely tempered steel instruments produce but little impression upon it.

The *crusta-petrosa*, or cementum, is a thin lamina of true bone, which, together with the enamel, forms an encasement around the dentine. It surrounds the root, and extends a short distance within the pulp cavity. It is thinnest at the neck, and found in greatest abundance just below the middle of the root.

The *pulp* is, for the most part, composed of a very delicate reticulation of blood vessels and nerve filaments. It is situated in the pulp cavity, before noticed, and is essentially a centre of nutrition and sensation.

We have now in this general way given a hasty glance at the respective relations of the dental tissues, and as we progress, it will be found that in their formative and developmental processes, they are intimately associated with the epithelium, basement, and alveolar tissue of the great mucous system.

About the sixth week of fœtal life, according to Mr. Goodsir, is observed a slight "groove" or depression on the surface of the mucous membrane covering the rudimentary maxilla. It has a direction corresponding to the bone, and is bound in front and behind by a fold of the membrane. During the seventh week, a point merely may be seen, arising as it were from the bottom of the groove, which constitutes *the dental papilla.* Subsequently to this time, processes are sent off from each wall of the depression, which unite and thus surround the papilla, or as expressed by Mr. Nasmyth, form a "fence about it."

During the papillary period may be observed the incipient formation of the enamel pulp, as a "soft gelatinous substance," (Goodsir,) of whitish color, which encircles the base of the papilla like a belt, (Nasmyth.) The original point grows rapidly, its apex rising above the level of the follicle, and then, as by an arrest in the former, the walls of the latter enclose it, leaving, however, for a time, an aperture through which, as stated by Mr. Goodsir, a bristle may be passed, but which afterwards is closed by a coalition of the sides of the follicle. Together with the development of the papilla, proceeds also that of the enamel organ, so that when the former is surrounded by its sack, the space otherwise intervening between the two is filled up by the latter. We shall pass over the consideration of the organ just mentioned for the present, since at another time and place it will be duly noticed at some length.

The *structure* of the papilla during the follicular stage, is in a marked degree homologous to a tactile papilla, or a hair pulp; consequently, we observe in each an epithelial layer, a basement membrane, beneath which are found nucleated particles, and granular matter floating in a plastic lymph, and the submucous or alveolar tissue supporting the capillaries and nerves. It is, however, only during the early stage that the vessels and nerves

are found at the base of the organ, for, as we shall see presently, they increase and occupy the body of the pulp as it is developed, and are distributed after a well determined and beautiful manner.

The changes which have taken place to form this new organ, like many other natural operations, are truly remarkable. The papilla, now enclosed in a sack, becomes the dentinal pulp. The mucous membrane is no longer recognized as such, its epithelium having disappeared or assumed another form, and consequently a new function; the basement, also, according to some authors, is absorbed, and its place in the reflected portion, supplied by another simple homogeneous membrane, whilst the submucous tissue now constitutes, for the most part, the dental capsule.

We will now examine this subject more minutely in the sacular or second stage. Upon a general view of the dentinal pulp, it is found to consist of blood vessels, nerves, alveolar tissue, plastic lymph, granular matter, nucleated cells, and an external membrane.

As before remarked, the capillaries occupy more of the body of the organ in this than in the follicular stage. They are distributed in a delicate alveolar tissue, and furnish the plastic material for the developmental cell process. (Todd & Bownan's Phys. Anat.) After dividing and subdividing extensively, they terminate in diminutive loops on the pulp surface.—(Nasmyth's Researches on the Teeth, pls. viii., ix.) Beyond these vascular limits, however, it is urged by some that there is another circulatory apparatus, in which normally is moving a white blood or serum, as in the cornea of the eye, which, being connected with the red capillaries, extend through the dentine, and is there distributed. That red blood may be observed sometimes in specimens of dentine when examined by the microscope, is a fact which in this day cannot for a moment be called in question. (See Harris' Prin. and Prac. of Dent. Surg.) But it does not seem to us a proper interpretation of it to infer that dentine, in a healthy condition, is supplied with red blood, for, so far as we have been able to inform our-

selves, the specimens so examined were taken from teeth in a diseased state. Now, regarding the fact in the light of a natural dissection, we may suppose that by the morbid action going on in the organ, the circulators of white blood have been permitted, so to speak, by a law of the economy, when so circumstanced, to receive the red particles; or more plausibly still, by the same inflammatory process of the pulp, the red corpuscles are disintegrated and broken down, whilst the coloring matter is taken up and diffused, less or more, throughout the dentine, either with the agency of the dentinal tubuli or those diminutive channels just mentioned, which only exist as yet in hypothesis. All this, we are aware, in the present state of knowledge, is mere speculation, but it is the most satisfactory or specious explanation of the observations before noticed, and also of the peculiar pink hue which diseased teeth are sometimes known to assume.

The *nerves* of the pulp are distributed like the capillaries, and are said to terminate by fine filamentous loops, in the convexity of which "the white substance of Schwan" is not always to be detected. (Todd & Bowman's Phys. Anat.) That this ending is the ultimate limit of the nerve, is a point which we very much question. We now know that in different parts of the body, they terminate by single filaments, as in "the Pacinian corpuscles," and for anything known to the contrary, they may terminate in some such manner within, or upon the dentine. Though no one has ever demonstrated their presence to sight, it is very probable, nevertheless, that they do exist there. Every one is familiar with the fact that dentine is quite sensitive to the touch, even in a healthy condition, and becomes more so when subject to diseased action. Now, this is a physiological fact that can only be explained satisfactorily on the hypothesis, that the dentine is supplied in some manner with nerves, for as yet we have no knowledge that a function can be manifested without its proper organ to produce it.

The *plasma* is most probably the serum of the blood, furnished by the capillaries, and holds in solution the nutrient elements for the formation of the cells, as well as the earthy materials for the construction of dentine. The cells themselves originate,

perhaps, directly from the proximate elements, and increase in number by the process of "division;" for if a pulp be examined from within toward the surface, its cells will be perceived to have a graduation of development, so to speak, from the simple aggregation of granular matter, up to the full sized cell.

The development of the pulp cells, Mr. Tomes divides into three stages; the first or alveolar stage consists of a "meshwork of delicate fibres and bands of homogeneous matter, in the thicker part of the walls of which are scattered here and there nucleated cells, while the meshes are occupied by a thick, clear homogeneous fluid or plasma, and in this are a number of nucleated cells." This stage precedes, and is preparatory of the next or cellular, of which he says, "the cells have no definite arrangement as regards each other, but are thickly scattered at pretty regular intervals throughout the section." In the third stage, the cells are arranged in a "linear succession," and have a direction vertical to the plane of the dentinal surface. (Tomes' Phys. and Surg. of Teeth, p. 85, 86.)

The views of Mr. Nasmyth are somewhat at variance, however, with those just noticed. According to this gentleman's observations, it appears that the cells, numerous and of infinite diversity of shape, "are evidently disposed in different layers throughout the body of the pulp," the deeper seated being "ill defined layers," whereas, those near the surface are arranged concentrically, and present in a section the form of "*reticular leaflets*." (Nasmyth's Research on the Teeth, p. 139, fig. 29.) Whatever be the diversity of expressions on this subject, those cells which approach the pulp surface are described by all authors as having an arrangement in a linear succession, thus apparently seeking an adaptive purpose in reference to the formation of the dentine.

On the surface of the pulp is a transparent and homogeneous membrane, before alluded to, which, at a late period, is structureless, but when first observed, it is found to contain cells. (Nasmyth.) Upon its outside may be seen little pits or depressions, of an hexagonal shape corresponding to the endings of the tubuli; into those the enamel rods are inserted.

Dentine.—We observed in our first notice of the dental tissue, that this substance is regarded by some as only a modification of bone; and, indeed, if we adopt the views of those that support the tubular theory, there will be found a certain degree of analogy; thus, in the dentine we have a vascular membrane—the pulp, tubes or canals, and in some parts lacunæ, each of which have a counterpart in the Haversian system of true bone. But it is a little premature, perhaps, to pronounce positively upon this subject, since the very points of analogy are still under consideration by the investigators of dental tissues.

The *structure* of dentine, though investigated by Tomes, Owen, Todd, Bowman, Nasmyth, Arnold, Goodsir, and other eminent men, is still among "the vexed questions" of microscopy. It would be an undertaking far too extensive for our present purposes to pass in review the different opinions of all these gentlemen, and, therefore, confining our remarks to narrower limits, will describe without detail, the main features of the theories supported on the one hand by Mr. Tomes and others, and on the other by Mr. Nasmyth.

Dentine is composed of a tubular and an intertubular substance. The tubuli communicates with the pulp cavity, and radiate from it as a centre toward the dentinal surface. Their direction, however, are not in straight lines, but as remarked by Todd and Bowman, are curved like the italic letter *f*, and which also in turn are made up of smaller or secondary curves. From the main tubes pass off lateral branches, which, anastamosing with those of other tubuli, facilitate the intercommunication of dentine, and at the same time, by forming so many arches, contribute in a great degree to increase the strength and density of the tissue. The form and direction of the tubuli are not constant, but vary in different teeth, and in different parts of the same teeth; thus, a section from the cutting surface down to the pulp cavity, in a vertical direction, present the fibres in almost right lines, whereas on either side of the dental axis they are less or more curved, and between the roots of a molaris, they have been described by Mr. Tomes as possessing a spiral character. In some of the tubuli their branches go off

in pairs, and are opposite; in others alternately one above the other from each side. There is an arrangement in the dentine corresponding in position to a fibre, which is not unlike a string of beads, each of which is represented by an original nucleus; such an arrangement, Mr. Tomes regards imperfect, the developmental process having been arrested. (Tomes' Dent. Phys. and Surg., p. 38, fig. 21.) For a more detailed account of the multitudinous forms of the dentinal fibres or tubuli, we must refer to the writings of Owen, Tomes and others.

The formation of dentine is another of those interesting natural operations, of which, as yet we have only outline notions. The deposit of the inorganic material is first observed in the transparent and amorphous membrane, at a point corresponding to the tip or cusp of the future tooth, and then progresses over the surface "down the sides and towards the centre" of the pulp. The cells in linear succession are placed against the inner surface of the dentinal membrane; their nuclei elongate, and at the point of contact the walls of each are absorbed, and thus form a continuous tube. The earthy matter is now deposited within the cell membrane—around the tube—and in the densest and most compact part of the fully formed dentine; this is "the tubular substance."

The intertubular tissue is formed by the deposit of inorganic matter in the plasma, between the cells, after the manner somewhat of bone formation, and like the latter, in its ultimate texture is supposed to be granular. In this case the plasma is to the dentine what cartilage is to bone—an hypothesis which waits further investigation.

We have all along assumed that the dentine is furnished with tubes having a definite calibre; and the ground for believing that they are such, we may sum up in a quotation from a learned source: "On the surface of the pulp cavity, the orifices of the tubuli can be seen; and in transverse sections of the tubuli, their proper walls, the width of their walls and calibre and their distance apart are all discoverable." "Their hollowness is proved by the chasing of bubbles along them, visible under the microscope when turpentine is added to a dry section, and also,

by the gas which may be seen to be disengaged in bubbles, chiefly from their interior, when a section is similarly treated with acid." "We do not regard the tubuli as filled up by solid contents, but as possessing a truly hollow bone designed to give passage to fluid." (See Todd & Bowman's Phys. Anat. p. 530, also Tome's Dent. Phys. and Surg., pp. 39, 41, 42.)

These evidences are stated as facts made known by the microscope, and their truth or error rests solely upon future investigation. Mr. Nasmyth objects to the tubular theory of dentine, if we may so call it, and urges that the appearance of tubes is wholly deceptive, arising from the manner of preparing the specimen for observation; and, consequently, has conceived another and better method than that usually followed, by which he is enabled to present the true and constant structure of this tissue. (Research on the Teeth.)

The dentine being formed from the pulp by a deposition of calcareous matter in its cells, retains their persistent reticular arrangement in concentric layers. In corroboration of this assertion, a transverse section of dentine in very thin lamina, when viewed under the microscope, presents an infinitude of little "circles which intersect one another in all directions;" and a vertical section viewed in like manner, presents the faint outline of the cell parietes, surrounding the earthy matter; and both of these arrangements correspond to that of the original pulp cells as supported by our author. Now, if the last section be submitted to acid, so as to remove the earthy constituents, and attentively observed, there will pass in the field of vision a succession of disclosive scenes, which are demonstrative of the truth of our previous remarks. At first, the acid removing a part of the earthy salts, leaves the cell walls surrounding the inorganic substance, and having an arrangement of the "reticular leaflets;" next, when nearly all the earths are removed, the fibres are seen as lines, from the sides of which extends little processes, supposed to be the remnant of the cell walls; and lastly, when all the earths and cell walls have been dissolved and washed away, there is left the isolated fibre made up of the

persistent solid nuclei, arranged in "the linear succession," and hence called by Mr. Nasmyth "the baccated fibre."

Now it would appear from the above statements, that the cells and nuclei retain their integrity as such throughout, and at the proper period of the developmental process the former receive earthy matter, and are most probably the true formative organs of dentine; whilst the latter, still occupy their position in the sides of the cells, and constitute the baccated fibre for the transmission, it may be, of a nutritive fluid.

It is contended by our author, that the tubuli, so called, are not in truth tubes, but are fibres, such as we have just described. Among other reasons for this belief we may briefly state the following: 1st, that fluids can *not be made to enter them;* 2dly, *compression* of them does not manifest the same appearances, which well defined tubes do when similarly treated. 3dly, The diameters of the fibres correspond to the admeasurements assigned by others to the tubuli, and 4thly, transverse sections when viewed under the microscope do not present any evidence of apertures or orifices of true tubes. (Nasmyth's Researches on the Teeth.)

We have now hastily glanced at the two theories of the formation and structure of the dentine; and as we observed in our first remarks, opinions on subjects of this character can only be verified by demonstration from future investigations; we shall, therefore, pass on to the consideration of the next tissue in order.

Enamel.—This substance, placed upon and external to the dentine, possesses a smooth and polished surface, is of a flinty hardness, capable of resisting the edges of the best tempered steel. It varies in color in different individuals, from a chalky whiteness to a dark yellow, all of which shades are marked and characteristic indications of the kind of teeth, as well as the amount of constitutional vigor at the time of their formation. Enamel is the thickest on the cusp, and becomes thin in the depressions of the grinding surface, and on the sides toward the neck of the tooth, where it exists only as an attenuated lamella. In transverse sections, it presents an arrangement into hexagonal

compartments, each of which is the end of an enamel rod. Viewed in a vertical section, the rods seem to be placed between two lines, and are marked into divisions; but Mr. Nasmyth describes them as made up of cells of a semi-circular shape, the convexities of which look toward the external surface. They are for the most part parallel with each other, and rest in the depressions on the dentinal surface, which we have already described. In the newly formed tissue, distinct tubes may be seen in it, which at a late period are obliterated or filled. (Tomes.)

Whilst treating of the papillary stage, we referred to a little ring of whitish matter, about the base of the papilla, the early appearance of which was first noticed by Mr. Nasmyth, but at a later period of development, was previously described by Mr. Goodsir as "the gelatinous granular substance;" this is the enamel organ. When the papilla is enclosed in its sac, this organ occupies the space between the two, and rests closely upon the former as a cap or "hood." (Raschkow.)

The structure of the enamel pulp, like that of the dentine is cellular, and its development, for descriptive purposes, is said to take place by three stages, which we will, without detail, now notice. And first: the granules and peculiar nucleated cells float in their plasma, in the reticulations of a "very fine structureless fibre, which proceeds from the membrane of the sac," and through which also ramify "minute blood vessels." (Tomes.) Secondly, by a gradual transformation apparently, the first stage passes into the second, in which the fibres instead of having an irregular arrangement, "radiate from central nuclei, take a straight course, and join other nuclei that are similarly circumstanced." In consequence of this radiate appearance, their fibres are called *the stellate tissue;* and along with its cells and nuclei constitutes the enamel *pulp* of Todd and Bowman, in which also Mr. Tomes includes the reticular tissue of the first stage. The cells are of an oval shape, and contain nuclei, and nucleoli; they increase in number by an accession of cells resembling their nuclei. Thirdly, this stage is formed from the last, (Todd and Bowman,) and is made up of a layer of nucleated cells of a flattened elongated shape, upon which rests a columnar epithelium.

These form the enamel matrix or membrane of some authors, and correspond to "the villous surface" described by Mr. Goodsir. (Tomes' Dent. Phys. & Surg., p. 97, fig. 54.)

Mr. Nasmyth describes the enamel pulp as composed of three kinds of cells; the first class found in the interior, are flat and triangular in form, and are connected to adjacent cells by means of delicate filaments prolonged from one of their angles. The second class are situated on the superficial and deep aspect of the latter, are of an oval shape and form an envelop to the preceding. The third class correspond to the epithelial layer before mentioned, with the exception that the nuclei of the cells are not persistent. (Nasmyth's Researches on the Teeth, p. 105.)

We do not feel ourselves able to harmonize the opinions of Mr. Tomes and Mr. Nasmyth, unless the first class of cells of the latter gentleman correspond with the transition of the first stage into the second of the former; for as it seems to us, Mr. Tomes includes in his description of the structure of the enamel pulp, the reticular tissue in which "minute vessels ramify," which Mr. Nasmyth regards as belonging to the dental sac, or as we should say, corresponds to the structure on the inner surface of the sac, as made out by the last gentleman. If this remark be correct, then the one opinion corroborates the other of the structure of the pulp.

Calcification, or the formation of enamel, begins first on the dentinal surface, by a deposit of inorganic matter in the columnar cells, and progresses by the superposition of other and similar cells, till the process is completed. The origin of the earthy matter is evidently from the blood; but do the vessels transmit the earthy salts in solution by the agency of cells to the desired point, or do they ramify on the enamel membrane? The last view, first published by Raschkow, we believe, has been corroborated in a series of experiments upon the young of the inferior animals, as well as in the human fetus by Professor Harris; and at this time is strenuously supported in his lectures. (See also Harris' Princ. & Prac. of Dent. Surg.) The opinion expressed in the first query is also supported by Tomes, Nasmyth, Owen and others.

May not this diversity of opinion arise from the different periods of the developmental process at which the examination is made? At an early period of the enamel pulp, as we have seen, it is composed of a plasma for the most part, and cells which are in process of development for the formation of the enamel; at the same time, it takes place at the expense of the plasma, or in other words, the plasma is consumed, as may be proved by observation; and in consequence of these changes, the vascular layer of the sac approaches the enamel membrane, and eventually is brought into immediate contact with it, so that in consequence of this relation, the enamel membrane would put on the appearance of being traversed with vessels.

Crusta-petrosa, or the cementum, is essentially an osseous tissue, possessing, however, less of its marked characters in some parts depending on its extreme thickness. It is situated in the alveolus, surrounding closely the root of the tooth, and extends a short distance into the orifice of the pulp cavity. The ultimate structure of cementum is granular, and when found in abundance is laminated, and traced by vasculur canals from which radiate tubuli as in bone. Like this substance, also, cementum contains lacunæ whose canaliculi on the outer surface are directed toward the alveolar walls: but within they are, less or more, connected with the granular layer of dentine, as well as the dentinal tubuli. (Tomes.) But this idea would lead to the notion of a vital connection between the cement and dentine; a relation which Mr. Nasmyth denies, and affirms, "that its union is one of mechanical contact, and its purpose purely mechanical." (Nasmyth's Researches on Teeth, p. 81.) The formation of the cementum, like the other dental tissues, is by cell agency or a pulp. It is placed in the alveolus between its periosteum and the dentinal pulp, and composed of an areolar tissue connected with the former, the interstices of which contain the plasma, granules and nucleated cells.

The nucleated particles are of an oval shape, and arranged at right angles to the dental axis. Ossification first occurs in the granular matter about the neck of the tooth, where few cells only are found, and then progresses on the dentinal surface of

the pulp, involving the cell walls, whilst the nuclei retain their persistence, and eventually become the lacuna, before mentioned. The development of the cement is from within outward, and its plasma sustains a relation to it that the temporary cartilage do to the flat bones, for upon each, whilst the convertible material is forming externally, it is being transformed within, into the more permanent tissue.

In conclusion, we have now attempted, concisely as is practical, to present a statement of some of the more modern investigations of the structure and development of the dental tissues; and imperfectly accomplished as our part may be, it is hoped that we have given a correct interpretation of each opinion, and in no instance, sacrificed or distorted the truth.

ARTICLE VIII.

New Method of Supporting Artificial Teeth.

GENTLEMEN :

In the "American Journal of Dental Science," for October, 1853, there appears an article, by Dr. Wm. M. Hunter, of Cincinnati, Ohio, entitled, "another European principle Americanized;" intended by its author to illustrate a new method of maintaining gold plates *in situ*, by the use of gold tubes and compressed wood—a method of indisputable value, and applicable as a very efficient mode of supporting artificial teeth, in the majority of cases, not only with firmness, but with great comfort also to the patient.

We, on this side of the Atlantic, are considerably indebted to our American brethren for many signal improvements, both in mechanical dentistry and in the surgical application of the science; nevertheless, a feeling of honest pride induces me to assert my claim to whatever merit is due me, as the originator of the method described by your esteemed contributor.

In the "Medical Times and Gazette" of January 31st, 1852, an article appeared under the title of "remarks on a new method of supporting artificial teeth; by C. Stokes, Esq., M. R. C. S." This article, which I wrote, was intended to explain a method of applying wood, in combination with gold tubes, as a means of supporting gold frames in the mouth. The use of wooden pegs, or cylinders of hard wood in bone pieces, was very generally known and applied; but I can assert most positively that until the article which I wrote on the subject appeared in the pages of the periodical alluded to, the application of the principle of gold tubes and compressed wood had never been made either in England or on the Continent.

I acknowledge, with considerable gratification, Dr. Hunter's direct testimony in favor of the system I have brought forward and advocated. In this country, it has received the approbation of some of the most scientific, as well as practical, dentists of the day, and I can affirm, with perfect truth, that increased experience, extending now over a period of nearly three years, has fully confirmed my previous conviction of the value of the principle, and I am quite confident that the day is not far distant, when the use of rigid gold bands, with their many concomitant disadvantages, will be reckoned as one of the unscientific appliances of a by-gone age.

I am, gentlemen, your obedient humble servant,

CHARLES STOKES, M. R. C. S.

65 *Brook street, Hanover Square, London, January* 9*th*, 1854.

The use of artificial teeth is, at the present time, so universal in every rank of life, and we may add, their utility is so indisputable, in heightening the charms of personal appearance, and in assisting to maintain the general health in a favorable condition, that every suggestion for their practical improvement is necessarily invested with considerable interest, and can hardly fail to engage the attention of every class of society, particularly that of the intelligent medical practitioner, to whose judgment and opinion in this special branch of practice reference

is constantly made by the public. If in the use of artificial teeth there are admitted advantages, on the other hand, unfortunately, the benefit is materially lessened by the injurious action which these substitutes exercise on the natural teeth; especially when bands or clasps are used as the means of supporting them.

When we examine carefully the enamel of teeth on which bands have rested for any length of time, we find, in the greater number of cases, that its structure has undergone a considerable change; the carbonates and phosphates are decomposed, and partially dissolved, leaving the surface of the enamel porous, and of a chalky appearance; the dentine is, under these circumstances, soon affected, the tubes break down, and caries in its true form is established. The system of maintaining artificial teeth *in situ* by atmospheric pressure, is not open to this objection; and in cases where the gums and palate are favorably formed, is a successful method of supporting them without inconvenience, and with sufficient firmness to assist mastication very materially. The proximate cause of the loss of teeth under the circumstances already mentioned, is undoubtedly the lodgment, between the bands and teeth to which they are attached, of particles of food, which, in combination with the saliva, undergo chemical changes, whence an acid is generated. If we remove from the bands of artificial teeth, a portion of this pulpy mass, which is found, in greater or less quantities, lying between them and the necks of the teeth round which they pass, and apply it to litmus paper, the latter becomes instantly reddened. It is the perpetual contact of this acid matter with the teeth, that gradually but surely effects such changes in their structure as ultimately to involve their loss. The true character of this acid product is at present undetermined by chemists of great eminence;* a fact which is of minor importance, per-

* "Various authors have assumed that lactates of the alkalies are present in normal saliva, and have referred the acid re-action which is occasionally noticed in that fluid to the presence of free lactic acid; but in the small amount of solid residue which is left by the saliva, I have never been able to establish with certainty the presence of lactates, even when operating upon considerable

haps, compared with its destructive action on the teeth under circumstances favorable to its development. A question of greater value undoubtedly is, by what means can this evil be obviated? or, if not entirely obviated, at all events materially lessened.

I propose to lay before the profession a system of mechanical aid in supporting artificial frames, which I have found practically to effect this object. A gentleman consulted me in the early part of the past year, in consequence of severe attacks of pain which he experienced in an upper molar tooth. He had worn, for nearly two years, artificial teeth, carved from the dentine of the hippopotamus, and adapted to fill certain spaces in the upper jaw, of which the following diagram, *(Fig. 1,)* is an accurate representation.

FIG. 1.

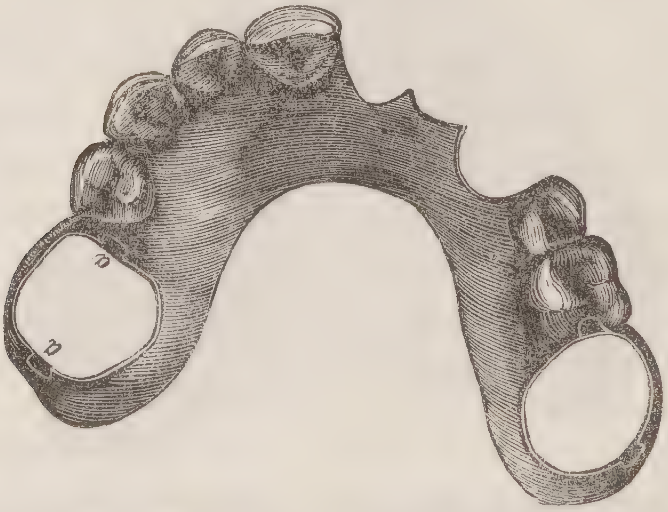
On examining the right molar, I found the neck extensively affected by caries, which was, in my opinion, the consequence of the re-action of the acidulated pulp to which I have already alluded. Some preliminary treatment enabled me to subdue the pain, and eventually to plug the tooth. As my patient felt assured that the continued operation of the original cause would again induce caries, either in that tooth or in the corresponding

quantities, obtained both from man and from the horse. I had, however an opportunity of collecting large quantities of the saliva of a patient suffering under *diabetes mellitus*, and in this case I convinced myself beyond all doubt of the presence of free lactic acid."—*Vide Lehmann's Physiological Chemistry*, p. 94.

molar on the left side, both of which were employed to support the bone frame, he was very desirous of having such a system of artificial teeth adapted to his mouth as would avoid this contingency for the future. After some consideration, I devised a plan by which I felt assured that his wishes might be fulfilled, not only without injury to his remaining teeth, but with an increase of security, and also of utility.

I substituted a gold plate for the inconvenient mass of dentine which he had worn, and proposed to support the new frame and its accompanying teeth by means of elastic wood, enclosed in a flattened hollow case, accurately adjusted to the side of each molar tooth in the upper jaw, so as to secure contact at every point in a line drawn from the neck to the crown of the tooth; the position of these hollow cases on the plate is seen in the accompanying *Figure* (2.)

FIG. 2.



Gold plate with teeth mounted on it, adapted to fill the spaces shown in *Fig.* 1. *a*, *a*, hollow cases to receive the wood.

A sectional view of these cases, with the wood inserted, is given in *Fig.* 3. I inserted into these cases compressed hickory-wood, which, by increasing slightly in volume when moistened by the fluids of the mouth, pressed the sides of the molars with so much firmness and uniformity as to secure the accurate adaptation of the frame to the gums, with a completeness which satisfied every requirement. I have, since the period to which I have referred, applied the same principle

FIG. 3.

a, *a*, Wood filling the hollow cases.

in numerous cases of partially edentulous jaws, varying its application according to the particular character presented by each case; in all of which the result has been highly satisfactory. I have therefore no hesitation in recommending its adoption in every instance in which it is practicable, being very confident that it combines security with great facility of removal and replacement; and, by preventing the lodgment of particles of food liable to undergo chemical changes, we necessarily remove an exciting cause, which, in many instances, involves the destruction of healthy teeth; in addition to which, we effectually banish from the mouth that unpleasant odor which so frequently accompanies the use of artificial teeth constructed in the ordinary manner.

ARTICLE IX.

Cleansing the Teeth. By T. D. THOMPSON, Providence, R. I.

THE different methods practiced by dentists, or persons calling themselves such, for removing the tartar from the teeth, or cleansing them, should, we think, be noticed. The good or evil resulting from these operations may be direct or remote.

The immediate or direct beneficial effects exerted upon the teeth, gums and sympathising parts, are such, usually, as to repay fourfold all labor thus expended; the teeth are freed from an injurious and corroding agent; the gums assume again their healthy action, and the air, the purity of which is so essential to a healthy circulation of the blood, is inhaled without contamination; in fact patients, and all who may be so situated as to receive the odor of the breath, at once perceive the grateful change. These, we conceive, to be some of the legitimate results arrising from a thorough and efficient cleansing of the teeth.

There are evils, likewise, to be noticed resulting from these operations. These injurious consequences do not result from the faithful and *honest* performance of these operations; but from a practice at once *dishonest*, and one which, we think, calls for the most decided reproof.

We believe where such is the known practice, the civil law should be invoked to punish the offender and *prevent* the infliction of injury that cannot be repaired.

Acid is often used as an agent in cleansing the teeth, or to remove the tartar from these organs. This is a common practice with some individuals; and instances are not uncommon where sets of valuable teeth have thus been mutilated, and even destroyed.

We have noticed the result of this practice on the incisor and cuspid teeth more particularly. We have frequently seen these teeth so much wasted as to be beyond the reach of remedial treatment.

We saw a young female, fifteen years of age, whose incisor and cuspid teeth had been destroyed, by the application of acid to cleanse them, in one year's time. This *valuable* operation was performed by a *dentist*, who advertised to cleanse the teeth "without scraping." This is by no means an isolated case; we have witnessed similar results from the use of diluted mineral acid, in cases of individuals in more advanced life.

We have referred to the remote effects of the improper treatment of the teeth—one case which has recently come to our notice, will be sufficient to illustrate what we mean.

A lady visited our office to have removed several parts of teeth, in either jaw, (her mouth was nearly destitute of teeth.) After complying with her request, she remarked that she attributed the destruction of her teeth to a dentist who made use of acid in cleansing them. The teeth had crumbled away, and the sharp angles had irritated her mouth very much. She showed me her tongue, on the left side of which, very near the apex, was a morbid growth about the size of a chestnut, its color and general appearance was that of a cancer. She said the formation commenced soon after her teeth began to decay, as though it

arose from the irritation of her tongue against the sharp angles of the decayed teeth. Her views of the case appeared to us to be correct; what the termination may be, time will decide.

What we wished to express by the remote effects of mal-practice in cleansing the teeth, is we believe fully illustrated by the last cited case. This person was suffering not from the loss of her teeth alone, but in addition, she was tormented with this morbid growth upon the tongue, which may eventually cause the destruction of her life.

If in the preceding remarks we have drawn a fair inference, what can be said of that individual who will thus tamper with the human system, who will thus mutilate such valuable organs as the teeth.

ARTICLE X.

Sponge Gold. By A. A. BLANDY, M. D., D. D. S.

THE use of other preparations of gold than foil for filling teeth, has, within the last three or four years, attracted considerable attention, and to Dr. Watts, chemist, of Utica. N. Y., the members of the dental profession are indebted for an article of crystalline sponge that bids fair to come into general use. This gentleman placed in my hands, a few months since, some specimens which he had prepared, with a request that I should submit them to such tests as I might deem necessary to satisfy myself fully with regard to their usefulness and value as compared with other preparations of the kind that had been made for the same purpose. Having charge of the large Infirmary of the Baltimore Dental College, where five operating chairs are constantly occupied, I at once instituted a series of experiments with this preparation, the result of which, I now take the liberty of making public. That the experiments might be fair and thorough, the use of foil, was, for the time, laid wholly aside,

and the crystalline sponge substituted in all cases, no matter what tooth or the locality of the cavity in it to be filled. At first considerable difficulty was experienced in the working and management of the material, our instruments being sharp or wedge-pointed carriers, adapted only for the introduction of foil, whereas for the introduction of the crystalline sponge, blunt concave-pointed instruments, roughened on the surface, are, for the most part, better suited for introducing and consolidating the metal. If the crystals are separated from the spongy mass before they are brought firmly in contact with each other, they escape into the mouth and are lost, and to prevent which, when the instruments commonly employed are used, requires a great deal of tact and skillful management on the part of the operator. But this inconvenience and loss, decreased day by day, as the operators acquired experience and familiarity in the use of the article, until finally beautiful fillings were made with it even in the approximal surfaces of front teeth, but I am compelled to say, that in the latter class of fillings, such result was only obtained at the expense of a greater amount of time and labor than is required with foil, and also with considerable more waste of material.

When the cavity in the tooth is deep, great care is necessary to prevent choking the orifice, as the crystals unite as soon as they are brought firmly in contact with each other. When this happens it is with great difficulty that an instrument can be forced through the incrustation. The process of consolidating the gold, therefore, should be commenced at the bottom, and against the walls of the cavity. Unless this is done, it will be impossible to give to every part of the filling absolute solidity. Again, if a sufficient quantity of the sponge to fill the cavity is not introduced before the mass is completely consolidated, it is almost impossible to add more, if the surface of that which was first introduced has become covered with moisture, unless the walls of the remaining portion of the cavity furnish sufficient mechanical support for its retention, or the gold already introduced presents a surface with one or more deep depressions capable of holding the fresh supply. This, of course, need not occur in filling a

cavity in the grinding surface of a tooth, but in the approximal it is particularly liable to happen. For filling a cavity in the grinding surface of an inferior molar or bicuspid, this preparation of gold is superior to any foil I have ever used.

No one need expect in his first attempts to use it, to be able to do so to his entire satisfaction. Nearly as much tact and experience are required for its skillful management as is needed to make a good filling of foil.

The cohesive properties of the crystalline sponge as prepared by Dr. Watts is vastly greater than foil, as the crystals when brought in absolute contact with each other, if there be no interposition of moisture, unite so firmly as to render subsequent separation utterly impossible, but this property becomes less and less manifest in the application of fresh sponge, in proportion to the solidity which has been imparted to the crystals by the pressure which has been applied to them. It is evident, then, in the introduction of the filling, the portion last applied should be a little more than sufficient to fill the cavity, as any after application may prove exceedingly troublesome, unless the gold has been kept perfectly dry and the instruments employed in condensing are of such construction as to leave a rough uneven surface which will render adhesion of the superadded gold more complete.

I was led to believe at first, that the crystallized gold, from its extraordinary adhesive property, might be used advantageously in connection with foil, but I regret to say that my hopes, as yet, have not been realized. I thought it possible that when a sufficient quantity of foil had not been used to fill the cavity completely, the sponge might be added and welded to it until the filling should be made flush with the surface of the tooth, and that in this way the latter might prove an invaluable adjunct to the former, but the experiments which I have thus far made have failed to confirm the suggestive hope which had thus occurred to my mind, they having proved wholly abortive. It cannot be made to adhere to an old filling, or, if so, more experience is required to make it do so than I have had in the use of the article as yet.

Among the inconveniences which I have experienced in using it, I will mention one more, and it is this: It being introduced in small lumps or irregular masses, is apt to condense unequally, leaving little depressions on the surface, alike difficult to erase, as to remedy by addition. If, when the protruding portion of a filling, made in the ordinary way with foil, is filed down to a level with the surface of the tooth, a minute depression is found where the gold has not been thoroughly consolidated, a perforation may be made in it with a strong sharp or wedge-pointed instrument which may be filled and the entire surface rendered perfectly smooth and susceptible of a high polish. But this cannot be done with the crystalline sponge, nor can the imperfection be so easily remedied. It will offer more resistance to the pressure of the instrument, and if a depression is made, it will be of a saucer shape, and of course more difficult to fill and finish than a perforation made in a filling of foil under like circumstances. The only certain remedy is to *drill* a hole into the defective part and fill this in the same manner as if it were the original cavity.

For these reasons it is desirable that the cavity should always be more than full when the gold is thoroughly consolidated, and in this case, a filling of unsurpassed beauty of finish can be made with it.

A more extended experience than any one has yet had with crystallized gold is necessary to an absolutely correct judgment with regard to its relative value as compared with foil, but from the experiments I have made, I am disposed to believe it will prove an invaluable acquisition to dental practice. Indeed, I almost feel warranted in the assertion that with an equal amount of labor better fillings can be made with it in the grinding surfaces of the molar and bicuspid teeth, and in large cavities easy of access in the approximal surfaces of most teeth, than with foil. But in small cavities, and especially in the approximal surfaces of teeth, not easily reached, and when partially covered by the edge of the gum, foil can certainly be used with much greater facility and certainty.

I have seen some most beautiful fillings in almost every locality

in the teeth, and even plate of firm texture made from this preparation of gold; also, a massive and well finished gold ring, and although we do not think it will ever supersede the use of Abbey's and Morgan's foil, we would urge for it a fair trial. That its use, to a considerable extent at least, will become general amongst dentists, we scarcely entertain a doubt.

Since the foregoing was written, an article on the use of this preparation of gold, which will be found in another part of the present number of the Journal, has been received from Dr. W. H. Dwinelle, who, as will be seen, has submitted it to the severest trials, and with the most satisfactory and gratifying results.

REVIEW DEPARTMENT.

ARTICLE XI.

SPIRITUALISM. By JOHN W. EDMONDS, and GEO. T. DEXTER, M. D., *with an Appendix, by* NATHANIEL P. TALLMADGE, *late U. S. Senator, and Governor of Wisconsin; "now concerning Spiritual Gifts, &c.," vol. i.* New York, PARTRIDGE & BRITTAN, 1853.

THOSE perfectionists who have been in the habit of congratulating themselves, their friends, and the human race generally, on the steady advance of the species to a high and pure intellectuality, must be a little staggered by recent developments. We have been so long entertained by self-complacent sneers at the dark ages, when people shuddered at white ladies that hovered over lonely wells, and grew mute with terror as the wild clangor of the spectral huntsman disturbed the quiet of the midnight sky, that we have almost arrived at the conclusion that we are superstition-proof. What have we in this glorious,

this enlightened, this highly esteemed and highly *besteamed*, this over-lauded, over-worked, over-acted, and over-done nineteenth century—what have we to do with Salem witcheries and pious butcheries, and hobgoblins, the terror of our ancestors? Oh no! it was our fathers' task to stone the prophets, to us has been reserved the more congenial occupation of garnishing the sepulchres of the righteous. We are the philosophical, we are the reflecting, we are the enlightened, we are the progressive end of humanity. We make steamboats, and build bridges, and found empires, and tame lightning, and imprison light.—We are in the scientific line which is fast excluding the theological. We are great investigators, profound philosophers, and our physical science is to revolutionize not only the world, but the heart, soul and mind of man.

This science of ours is to squeeze superstition out of mankind with as much ease as a steam hydraulic press might be supposed to squeeze lemons for punch. All that is necessary is, to wave our wand, and "hey, presto, change!" this dull and savage multitude of men becomes refined, intelligent, moral and religious. The difficulty is, that every perfectionist has his own particular conjuring stick, but it is generally agreed on all hands among this large class of that portion of the race which has had the inestimable privilege to date its birth in 18—, that the species is advancing, though each, of course, attributes it to his own particular perfection-machine.

Such is the perfectionist twaddle to which we have all been compelled to listen for many long years past. We have hardly had the audacity to suspect that there could be any superstition left in the world. For what could be the function of Mr. Snooks, the peripatetic phrenologist and friend of women's rights, or Mr. Smith, the ontologist and lecturer on all subjects before young ladies' schools and young gentlemen's lyceums, if not to drive all superstition from the face of the earth, and especially from the presence of our self-styled refined and intellectual society?

Unfortunately, however, at the very crisis of perfection, there breaks out, directly under the nose of Messrs. Snooks

and Smith, a superstition more contemptible, more disgusting, than any that has preceded it. This nineteenth century of ours, all perfection as it is, has begotten a monster as pernicious as any that the wild fancies of Mediæval barbarism has given to the world. It differs in one respect from the superstition of older days; it is destitute of the poetry which gilded the sombre edges of that intellectual cloud. In many of those old stories, there was often a touching pathos, a delicate though fantastic beauty, a grotesque grandeur, an unobtrusive but pure morality, which almost reconcile us to the mental degradation that would believe them. In this, there is only a bald, vulgar stupidity. You recognize its origin. It could have been engendered of no other brains than those of a set of sharp, sly swindlers, to whose imagination the narrow circle of a gold dollar was horizon enough. They have unmistakably stamped the monster superstition of the nineteenth century with their own image and superscription, and sent it forth into the world a naked cheat, devoid of poetry, romance or beauty of any kind—disgraceful in its origin, contemptible in its machinery, disgusting in its development.

The thing originated some few years ago with two sharp speculating women in New York, called, most appropriately, Fox and Fish. These females, of whose antecedents we know nothing, but of whose character delicacy certainly was not a prominent ingredient, ascertained that they possessed the power of making noises like knocks, with their knees. Of course, this kind endowment of Dame Nature was regarded by them as a money-making affair, the amassing of dollars being commonly conceded by their kidney to be the final cause of human existence. So they beat about for a route whereon to issue upon their "mission." The spiritual line suggested itself, and they boldly pushed forth after the golden fleece of the sheep that might consent to be herded by them.

Now, in all intellectual villages, and, indeed, in intellectual circles generally, there are always a few enthusiastic investigators who are ever ready to rise above vulgar prejudices, especially that absurd and antiquated one usually entitled common

sense. A number of scientific individuals of this class soon formed a clique about the Fish and Fox, and proceeded to enlighten the world upon the philosophy of these new and wonderful phenomena. This was as clear as mud to them, and they managed to make it equally intelligible to the community.

The dire contagion spread. Parsons soon began to dabble in these forbidden mysteries, and with their usual sagacious insight into natural laws, they united magnetism and electricity, of which they knew nothing, with spiritual manifestations, of which they knew less. The newspapers took it up, and sapient editors discoursed upon it with their accustomed ignorant omniscience. Schoolmasters, too, scientific *ex-officio*, as everybody knows, took up the same important question. Even doctors, we blush to write it, doctors, individuals at any rate who wrote M. D. after their names, mumbled strange incomprehensibilities about magnetism and biology. So the people, misled by all their guides, went mad in brigades, and the two female Barnums pocketed numerous dollars.

After a time some *physicians*, who were not merely M. D's, appeared upon the scene. Dr. Austin Flint, one of the most patient, candid and sagacious inquirers belonging to the profession, found the matter assuming an aspect sufficiently grave to demand his intervention. With his usual cautious induction, he accumulated a number of facts to prove that other women could and did produce with their knees the identical noises which so astonished the world when issuing from the neighborhood of these successful imposters. The next step was to place the two women in a position to throw their knees *hors du combat.* This was done, and forthwith the spirits became silent.

The imposture was now fully exposed, and Dr. Flint and his colleagues having satisfied themselves, published to the world the results of their inquiries. Unprejudiced minds were satisfied, but the poor gulls, who enjoyed the palpable hoax played off upon them, were, as might have been expected, indignant at the friends who unmasked the gross impostors. No one should have been surprised at this. People generally have a natural leaning towards the marvelous, and almost always prefer a falsehood to the truth.

"The lover may
Distrust the look that steals his soul away,
But faith, fanatic faith, once wedded fast
To one dear idol, hugs it to the last."

So the honest doctor and his coadjutors were environed by a clamor not less noisy nor more discriminating than that which bellowed in olden days around the fair Latona.

The Fish and Fox, moreover, unwilling to lose even that small section of their followers, who retained sufficient common sense to perceive that black could not be white, resorted to farther experiments, and, after numerous secret rehearsals, succeeded in developing the same class of sounds by snapping their toes. They then had another committee appointed, who placed them in the same position selected by Dr. Flint, which deprived them of the use of their knees only, but not of their toes. Of course, the same sounds were heard, and Dr. Flint, to the great joy of the noodles, was declared to be mistaken. The weak spirits, who had began to open their eyes, closed them again, and resubmitted themselves to the guidance of the fatal sisters.

After a while, the madness which was at first endemic in the centre of the Empire State, soon became epidemic. The mesmerists and biologists had prepared the way for it; they were the shabby John Baptists of this new Barnumistic gospel. The electric telegraph mixed itself up strangely with the spirits, and some dim references to the magnetic theory of the mesmerists were visible in the phenomena of spiritual manifestations.

But everybody who desired to humbug the public had not been so favored by nature as the two successful sisters. It was necessary, therefore, to find some other medium of communication. Then some bright genius discovered that if four people laid their hands long enough upon a light table, that article of furniture would tilt and knock upon the floor. Of course, spirits must have done this. There was, to the minds of these ghostly counsellors, no other way of accounting for the phenomena of table-tipping. It was of no avail to suggest the possibility of some physical cause. They were deaf to reason, impenetrable to common sense. So the table became a sort of snob tripod, and the sharps and flats who sat around it took the place

of the ancient priests, as interpreters of these mysterious secrets of cabinet ware.

After a time, as the influence of the humbug became more extensive, new machinery was introduced. Writing and speaking media made their appearance upon the stage. Possessed by these new "*incolæ Pythii*," their muscles were violently agitated, and they scribbled wild nonsense which their friends regarded as unveilings of the profound mysteries of another world.

In this condition, spiritualism now exists. The old tricks have been generally abandoned on account of the limited number of people who were gifted with the peculiar faculty possessed by its first apostles. The table was always ready, and any one who was disposed to impose on himself or others, could either fancy or pretend to fancy himself a writing, seeing, hearing or speaking medium.

The delusion, too, is spreading. It is one of those remarkable epidemics of insanity which occasionally prostrate whole nations under its baneful influence. It is on account of its hygeinic relations alone that we devote any attention to it. From any other point of view, we could not consent to look at it. We should feel as if we owed an apology to our readers for the space we took up in the consideration of such a barefaced fraud, were it not that recent circumstances had invested it with a gravity of interest, which, alone and unaided, it could never have excited in any sound mind.

The truth is, that hosts of ignorant and unprincipled charlatans are making use of this powerful machinery to enslave many human hearts, and to inveigle many simple spirits. The moral effect has already been frightful. Many a dark deed has been made to look glorious, many a vile scheme has been commended even to pure hearts by the potent influence of sham spirits. Many a villain has succeeded in carrying out his nefarious designs by calling to his aid this monster superstition.

Nor is this all. Even when this machinery is worked, as it sometimes is, by honest well-intentioned self-deceivers, it is productive of scarcely less mischief, though of a different char-

acter. People have gone mad over it, and in wild desperation have wrecked their own lives upon its Plutonian shore.

Hence, it demands the attention of every philanthropist, while to the medical philosopher, it presents an object of study of peculiar and absorbing interest, for the reasons which we have already mentioned.

To the medical man, also, there is another consideration of no little consequence. What shall be the therapeutical management of this frightful epidemic? To this a most desponding answer must be given. Those already attacked with it are in a condition well nigh hopeless. We can only have recourse to prophylactic agents. Let us check the spread of the disease, if possible, by fortifying those who are exposed to its influence, but as yet unaffected by it, by a few antidotes derived from common sense. Actuated by these ideas, we propose to devote a few lines to the examination of the pretensions of the self-styled spiritualists, especially to the notions advanced in the singular production, the title of which stands at the head of the present article.

The first trick with which this imposture began, has been sufficiently unveiled. None but the blindest of gulls can be any longer imposed on by this new species of knock-kneed women. The times were, indeed, "sadly *out of joint*," when such things passed for revelations of the profound mysteries of the other world.

But for the table business. "You cannot show," say the spiritualists, "that these phenomena are not dependent upon the influence of spirits. You cannot put your finger upon any well known force of nature which is competent to produce these motions. Baron Reichenbach's od-force has been, by general consent, ruled out as entirely too *odd* to be admitted. So that, as you have not proved, to our satisfaction, that we are wrong, we must of necessity be right." Such is the precious logic which constitutes the substance of spiritualistic arguments, though it is not always put forth in such an honest and intelligible form as we have given it.

The peculiar force of this admirable style of reasoning will

be better appreciated by taking another illustration of it. We assume that the moon is made of green cheese. The best authorities, indeed, do not believe it, any more than they believe that spirits move the table. But what do we care for authorities. We believe it, and we have a "mission" to promulgate the doctrine, and to prove it satisfactorily to all unprejudiced minds. As for the Newtons, and Herschels, and Laplaces, and their followers, they are so wedded to their old prejudices, that we give ourselves no concern about them, but address our irresistible arguments to the well known sagacity of the general public, the most enlightened portion of which, of course, consists of our followers. We prove our doctrine by the following incontrovertible train of reasoning. "That the moon is made of green cheese is a most ancient and wholesome doctrine, and *we* endorse it. It is agreeable to our notions of propriety that it should be so. Astronomers, indeed, deny it, but they have not positively proved to the satisfaction of ourselves and our friends of *what* it *is* made. Therefore, it remains perfectly clear and well ascertained that it is made of green cheese." Could anything be more satisfactory? Is it not the very repetition of the spiritualistic logic?

The table-tipping attracted much attention, and many were the theories advanced to explain these mysterious movements. Baron Reichenbach's od-force, the non-existence of which had been proved, long before he advanced any hypothesis in reference to it, was brought forward by some. Others while fully admitting all that had been asserted in reference to the action of the tables, attributed their activity to electricity. Of course, no one acquainted with the simplest rudiments of electrical science could assent to this hypothesis. It was the offspring of ignorance alone.

At this time Professor Faraday, beyond all controversy the highest living authority on all matters connected with electricity, appeared upon the stage. He showed the public the absurdity of the various theories which had been advanced to account for these motions, and by a simple but ingenious apparatus, proved that the movements did not originate in the table but in the persons

who surrounded it. This result had been confidently expected by those who had any previous acquaintance with recently developed laws in nervous physiology, so well expounded by Dr. Carpenter in the last edition of his famous "Principles." *Expectant attention*, or that condition of the mind in which by earnest looking for a particular motion, the nervous system is so polarized as to act directly upon the muscles and produce the anticipated result, is the true force which lies at the bottom of these phenomena, when they are honestly excited.

So far, then, there is no mystery in these things, none at least which cannot be revealed by the light of physical science. But, say the spiritualists, "how do you account for the intelligent responses given by the furniture when catechized by its attentive pupils?"

We answer first, that we doubt the intelligence of the table. It has amounted to nothing as yet, and is not likely to amount to any thing. It has not added the smallest fraction of a fraction to the sum of our knowledge. It has not revealed the thinnest edge of a new fact. It has been the baldest, flattest, stalest, most jejune repetition of the tritest moral saws. Its revelations have never risen above the level of those who sat around it, nor indeed could it be expected that the block under the hand should be more intelligent than the blocks upon the shoulders.

In the second place, we would say, that in every well authenticated statement of investigations into this business, it has been invariably declared that, whenever ordinary prudence had been observed in the concealment of facts which were known only to the questioner, the table made the most absurd mistakes, showing of course that the manipulators could gain nothing from the furniture which they did not possess themselves.

As for the medium business, swindling is so very easy in that line, that it requires miraculous stupidity to consent to investigate it. The dreary trash which they dribble out—the pompous weary drivel of their revelations is too somniferous for us. Opium, chloroform and all the sleepy drugs of the pharmacopœia could not more effectually benumb our mind. We therefore let that pass.

But really, we are ashamed of ourselves, that we have consented to treat so preposterous a subject with gravity. The revelations themselves are too ridiculous for any thing but Homeric laughter, if it were not for their results. But when people dash their brains out, and go mad about them, it is time to look into the matter.

It was but a short time since that a lady of our acquaintance assured us with the utmost gravity that at the meeting of a spiritual circle, she had summoned the shade of Napoleon into a band box, with which she manipulated, and made him dance the Marseillaise while she sang it. A worthy object, truly, for which to disturb the rest of that mighty spirit.

But many others greater, better than Napoleon are at the mercy of these daring experimenters. They can be summoned from the majestic regions of the dead where they slumber with princes and counsellors, for the most frivolous purposes. Any set of investigating noodles, or garrulous old women who choose to put their hands upon a block as senseless as themselves, can desecrate the sacred solemn repose of the mighty dead. That glorious "rest" which scripture says "*remaineth*," can be broken up at any time by dull heads nodding around as dull a table.

The old superstitions had at least the redeeming merit of poetry and a sense of fitness, of which this is wholly devoid. A spirit was in ancient days, only called from its repose by some powerful motive or some irresistible incantation. The magician must first draw his circle with consummate art, and collect all the materials of his ceremony with the utmost care. Then every thing having been done with the solemnity and gravity befitting so momentous an occasion, the invocation is said, and nothing less than the terrible and sacred name of the Creator which coerces all nature, brings the reluctant spirit from the Silent Land.

And when the modern spirits do leave their spheres, to what purpose do they come? What intelligence do they bring? What do they tell us? Why, that old Mrs. Smith's "rheumatiz" is as bad to-day as it was yesterday, and that it probably won't be any better to-morrow; that Mr. Jones is 77 years of age and had better prepare for another world; that there are several

spheres of spirit life, and that all are not the same; that two is not four, and that black can scarcely by an unprejudiced mind be mistaken for white. Then they throw matches about, and knock over furniture and slam doors, and tie pocket handkerchiefs in knots. We are gravely informed that Daniel Webster knows how to count, and that Henry Clay has not forgotten his multiplication table. To get off this and similar twaddle, these great spirits can consent to hammer out their dull revelations with a table leg. Who could imagine a slower or more stupid way for the quick intelligence of disembodied spirits to communicate with those they have left behind them. Those vivid intellects, that dart through time and space with such incredible speed, must stop to spell out in slow raps their messages. It is too absurd for any one out of the idiotic wards of an insane asylum to believe.

But it is time to come to the delectable composition which has excited this somewhat discursive commentary. As the title shows, it is the joint composition of a judge and a doctor, assisted, as they say, by the spirits of the departed, chiefly of Swedenborg and Lord Bacon. What the doctor's antecedents in this spiritual matter may have been, we cannot tell, but we gather from the book itself that the judge's mind was laboring under a severe affliction, which seems to have laid him open to hallucinations, and predisposed him to the influence of these singular errors. The evidence upon which his belief is founded can scarcely require any attention here. It is a mere repetition of the raps, writings, and revelations which have become such trite and common things.

Of Dr. Dexter's antecedents, as we have said, we know nothing. We never heard of him before, until his name was mentioned in connection with these assumed revelations. His *rôle* is that of a sceptic gradually converted to the truths of spiritualism, and the *evidences* are of the same nature of those which wrought conviction on the spirit of the judge. We pass these things by, and shall endeavor to ascertain what ideas of spirits and spiritual things this book contains.

In the first place, the absurd electrical theory is glanced at

rather than distinctly proposed. A paragraph or two, copied at random from the spiritual statements, will show the ideas entertained by the media.

"You sit in a circle. Now, the material constituents of which the body is composed, are alike in the bodies of men. And when you *sit in a circle, an equilibrium of the magnetic forces is established*, for electricity or magnetism exists in everything on earth, either in one condition or another. When by sitting, the equilibrium is established, then some one is selected whose *nervous system* is most easily controlled by the exercise of one will. I stand near him. * * * I establish a *concurrent simulation* with his nervous system, and thus have the control."

"When there is an accordance between two minds on earth, it increases the electric affinities, and makes easier the power to communicate."

"When there is an interruption to the full flow of the electrical current, and an *entire absence of passiveness* in the mind of the medium, it prevents communications, and at the same time *develops another principle* that acts antagonistically to the spirit influence. It becomes very important, too, that the minds of the circle should be directed to the subject discussed by the spirits, so that the nervous properties may be readily seized."

Now, the absurdity of these notions, and the remarkable ignorance of electrical laws and physiological science evinced by them, is too palpable to escape the notice of the merest tyro in these studies. The silly fancies of travelling mesmerists, and the exploded ideas of the electrical character of nervous influence constitute the staple of their theory.

If to these electrical notions be added the extraordinary one, to be found on page 169, the wonder of the reader will be excited to know what sort of ideas of physical science that man must have who could believe these two statements. We are there told that the evil spirits, after having passed into new bodies, are so heavy, "so much more dense than the other spirits, that they cannot maintain themselves even near the earth, but *sink far below it*, and are really of so dark a hue, that they are almost black." These ideas of gravitation belong to an age far more remote than that of Swedenborg, who is said to utter them.

The spirits who communicate with the two new prophets are Swedenborg and Lord Bacon. The latter assures them that his "nature has somewhat *progressed* since he left the earth," that he is not "that dull, matter-of-fact spirit *as* he was when a man on earth, &c." The Baconian language has certainly changed. That pure, lofty, Elizabethan English of the living Chancellor has sadly suffered. Not only does he indulge in such vile *patois* as that which we have just quoted, but gives utterance to the most infamous English. Thus he covers such adjectives as "*fartherest*," and is guilty of the most atrocious massacre, not only of the Queen's English, but even of the President's American.

One of the most amusing instances of a spiritual dodge occurs on page 113. They were conversing on the truth of Bacon's statements especially in reference to his identity, when the judge remarked that if he was *truthful* in other respects he would regard him as such in reference to his identity, and that he had in his mind a law maxim which he would like Bacon to write. The spirit answers that he cannot exactly say, but thinks it to be "that you are bound to believe every thing to be true until proved false." The judge replies "no, it is the very reverse." (*Falsus in uno, falsus in omnibus.*) The spirit then answers, "do you not know that when you try this test, you set on the doctor's mind itself to solve the question?" and adds, that he has not thought of earth's law for past a century.

The total failure of the judge to detect or even to suspect this manifest prevarication renders it impossible to place any reliance upon his powers of sifting and examining evidence of a physical character. Dr. Dexter's guess was a very natural one under the circumstances, but he failed to make a successful retreat and so retrieve the honor of his protege.

The religious sentiments of the book do not properly fall under our notice. It is sufficient for us to say that there is nothing at all new in them. They are only the old deistical and pantheistical notions, not even remodelled. The Mosaic account of the fall of man and the Evangelists' history of the incarnation are both denied upon the old grounds, and the

opinions advanced on these subjects would not require any examination from any quarter.

At the end of the book are fac-similes of the signatures and manuscripts of the various spirits who used Dr. Dexter's hand to write their thoughts. Prefixed to this is one of Dr. Dexter's notes to the judge. Now, though the general appearance of these different specimens of chirography seems at first glance to be very diverse, a careful examination will show a very close resemblance among them. A comparison of individual letters will satisfy the unprejudiced inquirer that they are all the same hand, very imperfectly disguised.

The general impression derived from the perusal of the book is, therefore, the conviction that it is a tasteless *rechauffée* of fragments of old and dead philosophies, and that it contains nothing of the slightest value or interest to any person of sound mind.

As to its style, it is very bad. It is at once jejune and stilted. An extreme paucity of ideas with an uncommon quantity of words is always disagreeable, but when that is added to a diction at once pompous and vulgar, which ignores all the laws of grammar and rhetoric, it becomes something more than merely tiresome. It was extremely injudicious in the doctor to select Bacon as one of his interlocutors, because the contrast between the stately, thoughtful, but simple style of the real Chancellor, and the pompous inanities of his counterfeit, is too palpable, and too easily made.

ARTICLE XII.

An Essay on a New Method of Adapting Artificial Teeth. By Dr. A. FITZPATRICK, Surgeon Dentist, &c., &c. Thacker & Co., London, pp. 40.

THE author of this essay resided many years in India, where, if the original correspondence can be relied upon, he practiced his profession with credit and success. The doctor, in his in-

troduction to his essay, starts at full speed, publishes his discovery, and at once and for ever claims originality, in the construction of plates for artificial work. This, however, should be excused, considering the author was somewhat isolated in his position, and may be said not quite "up" to the various improvements introduced by his American and European brethren. The introduction says: "My object in publishing this little treatise on *my* recently discovered mode of adapting artificial teeth to the human mouth, is that, being convinced of the importance of my discovery, I should lose no time in bringing it at once and prominently to the knowledge of the profession to which I belong, and of the public at large, for whose benefit it has been deeply and carefully studied, and is now openly and unreservedly published and divulged. I confess that at first I thought of security to myself by a patent, the advantages and profits of the invention, and so monopolizing the harvest which I believe is to be reaped from my successful labors and discovery; but I soon abandoned this idea, reflecting that the first duty of an educated and enlightened professional man is, to make known to the world, for the benefit of mankind, any improvement in art or science that can relieve the sufferings of his fellow creatures, or conduce to the alleviation of their afflictions, without reference to his own selfish interests or personal aggrandizement." A Harvey, a Franklin, or a Jenner, could not have spoken more to the purpose, or have attached a greater amount of importance to their LITTLE discoveries, than the present writer of this essay. If the doctor means in his observations respecting patents, that he is opposed to specifics for alleviating or curing disease, suspending the nervous functions during surgical operations, and such like, we most willingly agree with him.

But how comes it that the doctor did think of a patent, and seeking "a golden harvest," he seems to blow hot and cold with the same breath, for he says, "the advantages of improvements in the strictly mechanical arts, and the profits of invention, ingenuity in handicraft trades or occupations, ought, perhaps, to be secured to the discoverer for such a period of time as will reward his labor, and so serve as an inducement to others to

prosecute useful inquiries, and to direct their energies toward *honorable* and *lucrative* discoveries; but I take a wide view of the duty which he owes to society, whose profession it is to alleviate physical sufferings, remove deformity, or check disease."

Then why, we ask, did the author, if he sincerely entertain these views, think at first of patenting his invention, he cannot be aware that true dental mechanics strictly belong to the mechanical sciences, and as such, its position has been assigned by common consent by all writers upon this branch of dentistry.

We would infinitely prefer that a practitioner who has made an important discovery in mechanical dentistry, should avail himself of the patent laws, to his *secretly* confining the use of his invention to his own individual practice. Moreover, the doctor must be aware there are many trifles which, in the estimation of the party *interested should be patented,* but when brought into actual practice, and its value estimated by other parties, have been found wanting in the scale of utility, and consequently worthless; whilst others again are mere insignificant *specs* of science, that it would be perfectly absurd to think of a patent.

The author proceeds. "All the advantage I desire from my discovery, viz. the credit of priority in having introduced a total change into that branch of the dental art with which I am about to occupy the reader, and of having revolutionized the entire mechanical system of one of the most important operations of the dentist, that of fitting artificial teeth into the mouth with credit and satisfaction to himself, and relief and comfort to his patients." This kind of egotistical philosophy reads well in print, and probably sounds well, if well expressed, to patients in the operating room. We much question, however, whether the more sober thinking portion of dental practitioners will attach that amount of importance to the discovery as the doctor has by "having revolutionized the whole mechanical system."

Unquestionably, credit is due to the author, in treating this subject scientifically, and in placing it prominently before the profession, but we are bound, as journalists, to state that the whole merit of introducing this kind of work does not entirely

belong to Dr. Fitzpatrick. We remember having seen plates cut in a somewhat similar manner, and in use some eight or ten years since, having been manufactured by a Mr. Lukyn. More recently, in conversation with a brother professional, (Mr. Levison,) this gentleman also stated he had one by him made by the same party, and which had been worn by his patient for some years. As we before observed, we accord to the author the merit of having scientifically treated the subject, but whether its adoption in practice will warrant that amount of importance, in a scientific point of view, as attached by the author, remains to be seen.

Dr. Fitzpatrick, from his own account, has undergone intense mental and physical exertions in bringing this discovery to a successful issue, for he says, "with all the application and reflection that I could devote to what was to me a very interesting subject, it was a considerable time before I could arrive at even the fundamental principles of my discovery, and much more time, even when the frame work of my theory was arranged, was consumed in filling up mechanical deficiencies, or evading the impediments momentarily cast in my way by anatomical or physiological difficulties." The author appears to have the most extraordinary ideas of his professional brethren, when he pictures to himself the *opposition* his new plan will meet with, owing to "the old wedded opinions and theories," and the increase of labor and expense necessary in making the plates. He may make himself perfectly happy upon that point, if this new system is found to possess only one-half the merit the learned doctor claims for it; he may rest assured the profession, either in Europe or America, will not oppose its adoption from either an increase of expense or labor, he observes: "In making public my new mode of fixing artificial teeth in the mouth, I am aware that I shall meet with opposition from many who are wedded to old opinions and theories, and to the routine of the practice hitherto in use in the profession to which I belong. Prejudice with some, and increase of labor and expense with others, in some cases both combined, will militate against the sudden and successful introduction of the

great and important innovation which I desire to introduce into the mechanical branch of our profession."

After quoting several authors relative to the value and importance of artificial teeth as auxiliaries to health, he makes the following sensible observation upon the sense of taste: "Now, as it is evident that the delicate discrimination in the taste of different articles of food may be so materially effected by the natural state of the palate, how much more must it necessarily be influenced when art interferes with nature, by introducing into the mouth a foreign substance, either metallic or otherwise, of such a form as to completely cover the palate, where nature has, in her all-wise beneficence, taken care to provide nerves of exquisite sense, which ramify over it from their main trunks, arising from behind their central incisors, and others distributed laterally, proceeding from the posterior portion of the palate, besides which, in order that the food may have as extended a plain of action as possible, the surface of the plate is corrugated, thus considerably enlarging the expanse of membrane exposed to the contact of the different aliments."

The author describes the various kinds of plates now employed for fixing artificial teeth upon, and concludes his essay by claiming the following advantages for his own plan:

"The first advantage that I obtain by this plate is, that the palate being uncovered, can maintain its healthy state, which it cannot maintain if perpetually covered."

"The second advantage, that the teeth and plate do not require to be taken out at night, and by this the expense of night teeth, so often necessary for the comfort of the patient under the present system, may be avoided."

"The third advantage is, that the palate not being covered with metal plate, no food can get between it and such plate, and consequently no irritation of the mucous membrane can take place."

"The fourth advantage is, that the mechanical friction, or the galvanic influence that might take place, is perfectly avoided by giving free action to the circulation in the palate."

"The fifth advantage is, that whereas, under the present sys-

tem, in cases in which gold could not be employed, in consequence of its hard and unyielding nature, patients were obliged to have recourse to bone; but, on the other hand, as my plates give every freedom to the palate, the use of bone can be entirely done away with."

"The sixth advantage is, that the parts supplied by the principal nerves being uncovered, and the palate exposed to the influence of the saliva and tongue, the faculty of taste is not impaired. This will not be considered of trifling importance to those who are fond of the pleasures of the table."

"The seventh, and not the least advantage, is, that the front of the palate being uncovered, there is no impediment to the speech, as occurs in many cases where the palate is covered by the plates now in use."

"The eighth advantage that they possess is, that they do not require to be taken out daily, as no food can lodge between them and the plate, it being necessarily carried off by the tongue."

"The ninth advantage is, that though strong, they are light, and have quite as much strength as if the palate were covered."

"The tenth advantage is, that they give less trouble to the patient on their being first placed in the mouth, and consequently the tongue being perfectly free, and finding no obstacle, gets used to them at once."

The author's remarks upon the employment of cheap materials, inferior workmanship, &c., in the manufacture of mechanical work are excellent, he is evidently only partially acquainted with this subject, for we can assure him, there are practitioners of a higher grade in public estimation than the low, cunning, advertising cheap fraternity, who do not scruple to insert pieces of work in the mouth of the most inferior workmanship and worse fits, yet charging the most exorbitant prices. As for their fillings, its the *exception* with two or three of these worthies, when they do *attempt* to fill lateral cavities with gold, most generally the *amalgams* is their glorious compound. Yet some one of these men calls himself the "Dental Mæcenus" of the "Sabine Farm." Alas—poor Horace, to what a wretched state of degradation thou hast fallen.

Having now perused Dr. Fitzpatrick's essay on his adaptation of perforated plates, we must again repeat, the principle is not entirely original, the author unquestionably deserves much credit in bringing the subject prominently before the profession and treating it upon scientific principles, and we have no doubt that our brother professionals will soon test the value of the invention, and make their report accordingly. R.

SELECTED ARTICLES.

ARTICLE XIII.

On the Regulation of the Teeth. By T. W. EVANS, M. D., D. D. S., of Paris.

(Continued from page 265.)

THE few other innovations I have made I hope will be more successful; but they have had reference not so much to filling teeth as to regulating them, and it is to this subject that I wish, on the present occasion, to call special attention.

I need not impress upon any person in this audience, gentlemen, that irregularity of the teeth is one of the most fruitful causes of their decay. To prevent this irregularity, or where such precaution has been neglected, to remedy it, is one of the most important branches of dental science. I have, therefore, made it a particular study. Circumstances have favored this course.

Most of the persons who consult me in Paris belong to a class of society whose position renders it indispensable that whatever pertains to personal neatness and elegance should be attended

to with the most scrupulous care; and in this respect no subject is of superior importance to that under consideration.

No matter what charms one may possess, whether physical or intellectual, they are all more or less neutralized by defective or irregular teeth, which at once spoil the expression of the finest countenance and destroy the effect of the most refined manners.

In a country like France, especially where the love of the elegant and the beautiful is so intense as to have become almost a worship, so important a fact could not fail to be observed and appreciated; so that now, in the refined classes of society, no one can venture to neglect it.

The "human face divine" plays too important a part in society to be neglected. Personal beauty is too intimately connected with personal grace not to require much at our hands. Nature herself, aiming always at perfection, but thwarted in a thousand ways, supplicates our assistance. She summons our *art* to the rescue. But for our response to this summons, some of her finest works—and what finer work comes from her invisible hands than a symmetrical human countenance?—would never be completed. It is our aim—and herein is the true glory of our art—to study her original design, and aid in its faithful execution.

What picture is more repulsive to the eye, and alas, what one is more common to behold than a human face, originally a type of beauty, designed as a magnificent *facade* to the "dome of thought and palace of the soul," robbed of its fair proportions, and falling prematurely to decay? And how often is this sad spectacle owing to inattention to the teeth, those delicate and beautiful organs which seem, until recent times, to have been celebrated by poets only to be "neglected of men."

The mouth, more, perhaps, than any other feature, gives character to the face. It is the natural organ of the mind. Before the thought ripens upon the tongue, if not before it glistens in the eye, it blossoms upon the lip, which, by nature, is as sensible to the emotions of the soul, as the aspen leaf to the breath of heaven. Now, that the mouth may have its full and free ex-

pression—that the organ, so to speak, may be kept in tune, its delicate ivory keys must, of course, be kept well adjusted.

One of the most striking characteristics of man, as distinguishing him from the brute, is the power of rendering his thoughts and emotions, with more or less force, in articulate language. The faculty of speech; of clothing his "thoughts that breathe" in "words that burn," is one of the noblest gifts with which heaven has endowed him. The development of this faculty is, in all countries, one of the most powerful aids of civilization. It is to this we are indebted for all the charms of oratory, and for some of the most sublime effects of music. What influence is more potent in elevating and refining the mind than the harmonious utterance of sweet sounds?

"He that hath no music in his soul,"

saith Shakspeare,

"Is fit for treason, stratagem and spoils."

And this "music in the *soul*" craves always for fit expression through the melodious instrumentality of the *voice*. Hence the education of the voice, in these great days of universal culture, has become a subject of great interest and occupies some of our best minds. Now, for the voice to have its full compass and power, that it may fitly represent the various thoughts and emotions which call for harmonious utterance, it is obvious that the sensitive organ of speech and song, the delicately constructed mouth, be as perfect as possible in all its parts. Above all things it is necessary that there should be a perfect arrangement of the teeth.

Laugh, if you please, and if your dental condition is such that you dare to, but to me an oblique tooth seems often to represent an oblique thought. Indeed, who has not remarked that such a defect will sometimes give even a sinister expression to the most benevolent idea, and rob the gentlest word of its music and its meaning.

There is a story abroad of a man whose mouth was so disfigured by the irregularity of his teeth, and the natural expression of his features was so belied by this deformity, that he re-

gretted he could not prosecute his countenance for defamation of character.

The story is a little extravagant, I admit, but it is not without significance. I, myself, have known most estimable persons whose teeth were so mal-arranged as to give to the face an expression not only brutal, which is a common case, but almost malignant.

The question has even higher bearing. Irregular teeth often occasion irregular temper. The unfortunate creature whose dental apparatus is so badly arranged that he cannot properly digest his food becomes a dyspeptic, (often without knowing the cause,) gets nervous and irritable, ruins his constitution, and makes his friends and everybody about him, uncomfortable if not unhappy. And while in this state of mind, a man of originally good disposition loses not only his temper, but, to a considerable extent, his moral perceptions.

It is thus that the science of health is so intimately connected with the science of happiness, and that both have more to do than is commonly supposed with the science of morals.

I know, indeed, that there are said to be certain diseases which, as it were, rarify the grossness of the flesh, and make a man at once more sensible and more spiritual. But I am inclined to think, after no little observation, that no man was ever made more sensible or spiritual by the toothache; and I fancy that few men will discourse to you (at least from their own experience) of the regenerating influence of *dyspepsia.* I am skeptical also, as to the good moral or mental influence of an infected breath; there is, so to speak, an odor of ugliness about it, which is repulsive to everybody, and which can only be counteracted by an amount of personal goodness which few of us, alas, possess.

"Cleanliness," we are told, "is next to godliness," and if the proverb is true, the importance of a well-ordered mouth is so manifest that its "ivory tesselated courts" should be kept sweet and pure as a temple of worship. There are other considerations, of high moral bearing which might be presented, but I have already extended my remarks on this topic beyond what I

had intended. I trust that enough has been said, to show that irregularity of the teeth is a subject of sufficient importance to engage universal attention. And yet the world—to some extent, even the scientific world—is so much more occupied with effects than causes, with remedies than with preventives; in fine, with panaceas than with principles, that where we have one treatise on the irregularity of the teeth we have a hundred on its evil consequences.

I do not hesitate to say that nine-tenths of those who are in constant consultation with a dentist, would rarely, if ever, have had *personal* occasion for his services, if their teeth had been properly regulated in childhood. Irregular and defective teeth, now the almost universal rule would, if the proper precautions were taken, be the rare exception. Hence the pre-eminent importance of our profession; hence the family dentist is as necessary in every community as the family physician.

The eruption of the teeth of the second dentition is one of the most important stages of physical development; so that the *birth*, so to speak, of these teeth, requires the attention of the family dentist almost as much as the birth of a child requires the attention of the family physician. There is nothing like being *well-born!* Neglect in this respect, (I allude to the birth of the second teeth,) is attended, almost without exception, by serious consequences. But for this neglect, the painful extraction of teeth in mature age; tooth-ache—which has been called the "hell of diseases;"—and the necessity of wearing artificial teeth would be comparatively unknown. Hence, I do not express myself too strongly, when I say that attention to the teeth of children is not only a useful precaution but an imperative duty, and that (it cannot be repeated too often) no profession is more urgently demanded for the welfare of society than that of a family dentist. I have so constantly insisted upon these views in Paris, that my patients are now, for the most part, converted to my doctrine, and a large part of my practice is what may be called family practice. I am, in consequence, compelled to pay unusual attention to the regulation of the teeth, especially of children.

But for a long time I was seriously inconvenienced in my operations, for want of sufficiently complete apparatus. Much of that in general use I found to be often inefficient, and generally very annoying, if not injurious to the patient. I have accordingly spent much time in constructing apparatus suited to my own practice; apparatus uniting all the conditions of promptness and efficiency, and giving the least possible inconvenience to the patient. Ligatures, as generally employed, I found peculiarly open to objection; for, besides their rarely operating with sufficient certainty or steadiness, they often loosened the teeth to which they were attached for support, and almost invariably tended to lay bare the gums.

As for the other apparatus of bars, springs, caps, plates, inclined planes, &c., while there were portions of it not without merit, and some of it showing great ingenuity, it was, for the most part, so complicated or so cumbrous, that in the few cases where it accomplished the desired end, it did so only by an amount of fatigue and pain to the patient that he often found the remedy worse than the disease. These difficulties I have sought to avoid, and the success I have met with in most of my operations—some of them extremely difficult—has compensated me a thousand fold for my pains. The chief duty which remains to me is to communicate the result of my labors to you, my much esteemed colleagues, and through you to the profession at large.

The principal desiderata in apparatus for the regulation of teeth are:

1st. A firm support which shall not loosen or in any way injure the teeth to which it is attached. 2d. A steady and sufficient pressure, which can be graduated to suit particular cases, and particular stages of an operation. 3d. Great delicacy of construction that the apparatus may be as light as possible, so as neither to injure nor annoy the patient. 4th. Finally, a mechanism as simple as the case will admit of, in order to economise both labor and time.

I am aware, gentlemen, that in all these important respects great progress had been made long anterior to my departure

from America. On the other hand, I presume, I am only stating the experience of every member of the profession, when I say not only that the apparatus used at that period was far from being perfect, but that there is much to be desired even now. I infer this much not only from the nature of the case, and from my own daily observation, but because in reading the valuable dental journals which come to me from America, I see that more light is called for, and less given, upon this subject than upon almost any other. Doubtless, however, many improvements have been made which have not yet been made public, and I cannot help remarking, in this connection, that the delay in publishing the valuable discoveries which are made from time to time in our profession, is deeply to be lamented, for the advance of the science depends to a great extent upon such discoveries being immediately announced. I may add, that it is possible—probable even—that some of the improvements which have occurred to me in the seclusion of my laboratory may also have occurred, in the same manner, to some of you. It is not impossible, either, that among the discoveries made here, the knowledge of which has not yet reached the Old World, there may be some far superior to my own. If so, I shall be glad to have them communicated to me, that I may introduce them into European practice.

Case I.—The first case to which I would call your attention, as illustrating the advantages of the apparatus, is that of

Restoring an oblique upper incisor to its place.—The first thing, of course, is to make room for the operation, if, as is generally the case, room is required. This is accomplished by bits of India rubber one-sixteenth of an inch in thickness, which are inserted between the irregular tooth and its neighbor on each side, and is prevented from sliding up to the gum by means of waxed floss silk wound tightly round the middle of the tooth. The necessary space obtained, I take a piece of fine hard-drawn wire, about the size of a common pin, and winding one end of it twice round the middle of the oblique tooth, very closely, I pass the other end along to the bicuspids or molars, to which I attach it by means of a joint—mechanism of two nicely adjusted

bands or rings—forming a kind of yoke, which is slipped over two of the bicuspids or molars, and is prevented from slipping up to the gums, by means of wire clamps which hook on to their grinding surfaces. These clamps may be so constructed, when an operation requires it, as to prevent the teeth of the upper and lower jaw from coming in contact with or overlapping each other.

It will be seen at once, that if this apparatus is rightly applied, the hard drawn wire being elastic, and serving at once as lever and spring, will bring the oblong tooth round to its place in a short time. But in all cases where, from the age of the patient, or for any other cause, the tooth is too refractory to submit to so gentle a lever, I modify the apparatus as follows:

First.—Carefully adjusting a gold band (made of 22 carat gold, so as to be sufficiently malleable) round the centre of the tooth to be operated upon. On the front of this band, and directly across it, I solder a small gold tube, the bore of which is about the size of a common pin; through this tube, I pass a hard-drawn wire, fitting very closely, and then attach the outer end of it (which has a loop or eye for the purpose) to the yoke or skeleton cap above described, which is previously fitted to two of the molar or bicuspid teeth. In this way it will be seen, we have a more powerful lever than before, and one which is equal to any emergency. The operation being completed the tooth is kept in its place, by means of a small flattened wire, (somewhat smaller than a knitting needle,) which I pass in front of the incisors as far as the eye teeth on each side, to which it is attached by means of silk ligatures; this wire band is prevented from slipping up by means of a small frame work with two hooks, which I solder to it, and which taking hold of the cutting edge of the central incisors, afford a firm and steady support. It is obvious that the wire band thus arranged and sustained, will easily keep the restored tooth in its place. The length of time it must be worn depends upon circumstances. It should be removed as often as possible, for the purpose of cleansing.

Case II.—The next case I would submit to your judgment, is that of the

Protrusion of the front teeth.—I remedy this irregularity by means of a narrow elastic bar of gold, which is attached to the front of the teeth to be operated upon, by means of a kind of wire grating, constructed with hooks which take hold of the cutting edge of the central incisors, and keeps it (the bar) in its place. Having slipped this bar into the grating firmly, I pass the ends along to the two strongest molars on each side, to which it is attached, by means of short spiral springs; the molars used for support having previously had fitted to them the yoke or skeleton cap already described. Now, to give this elastic bar, with its spiral springs, an absolutely firm and steady support, which shall have its pressure equally distributed over the mouth instead of being confined to one or two teeth, I prepare a thin gold plate of the most delicate workmanship, which is moulded carefully to the roof of the mouth, and kept in its place by attaching it to the molar teeth by the apparatus which already secures the gold bar. This plate, if nicely moulded to the irregularities of the mouth, has its pressure, as I have said, equally distributed, and renders it impossible that the teeth used for support should be loosened, since they are sustained by the whole palatine arch against which the plate presses. The elastic bar, with its spiral springs, has thus the firmest and steadiest hold possible, and can only move the teeth which it is intended to move, and these it brings easily and quickly to their place. The patient easily gets accustomed to the apparatus, because of its great delicacy of construction and finish. I should add that, as the teeth come back to their place, they will naturally force the gum inward. The plate must, therefore, be removed several times during the operation, and be modified, both in size and form; care being taken always to have it nicely adjusted, and to keep it at least one-third of an inch from the backs of the teeth to be operated upon.

The advantages of this apparatus over the use of ligatures, as commonly applied, have already been hinted at in the course of the description. They may be summed up as follows:—1st. By avoiding the risk to which ligatures are usually liable of injuring the teeth, by slipping down to the gums. 2d. By

having an absolutely firm and steady support, equally distributed over the mouth, I avoid loosening the teeth used for support, and then give the patient the least possible annoyance. 3d. By means of the gold plate fitted to the roof of the mouth, I accomplish the important desideratum of acquiring a sufficiently strong support for any power I may wish to exert upon the teeth to be operated upon, without (as I have said) running the risk of displacing any others. 4th. In fact, the power obtained by means of my elastic lever and spiral spring, with their firm, steady support, is much greater than the traction of any apparatus of ligatures, or any apparatus whatever, not thus supported, and is, therefore, easier, more prompt, and surer in its operation. To keep the front teeth in their place, after they have been restored, I first remove the plate, which had been modeled to the roof of the mouth, and then readjust it upon a new cast, attaching it by the same means as before to the molar teeth; then taking a piece of hard elastic gold wire, flattened to about one-sixteenth of an inch in width, and pass it along in front of the teeth which have been operated upon, attaching the ends to the back of the rings which have been previously readjusted to the molar teeth on each side. This elastic band, pressing gently against the teeth, easily accomplishes the purpose.

Case III.—The next case which I have thought sufficiently interesting to describe, is that when, owing to the narrowness of the jaw,

The front teeth are forced back within the dental ridge.— The necessary space is obtained by inserting pieces of India rubber between the teeth, in the following order:—1st. Between the central incisors, having separated them sufficiently. 2d. Then between the lateral and central incisors, having separated them sufficiently. 3d. Between the lateral incisors and the canines, retaining the India rubber in their places. The next step is to adjust the yoke or skeleton cap already described, to the two strongest molars on each side of the mouth. Next, moulding the gold plate to the roof of the mouth, in the manner mentioned in the last case, commencing pretty well back, and

coming forward to within about one-fourth of an inch of the deviating teeth; this plate is attached to the molar teeth by the mechanism just alluded to—the whole forming, in fact, but one apparatus, each part of which is necessary to the other, and to the whole. Having thus secured the strongest and steadiest support, I solder one end of a gold wire (of about the size of a knitting needle) to the face of the innermost ring attached to the molar teeth, and as near as possible to the back edge. The other end of this wire, (the whole being hardened and flattened from the soldering point,) I pass along on the outside and parallel to the margin of the gum, at about one-sixteenth of an inch distance from the teeth, and slide it into a small tube, which had been previously soldered for the purpose, to the back edge of the skeleton cap, adjusted to the molars on the opposite side of the mouth. This bar is kept from slipping too far through the tube by being tapered at the end, which causes it to enter like a wedge; on the other hand, it is kept from receding from the tube by means of a small nut, or by being flattened at the end. The average width of the bar is about one-sixteenth of an inch. I curve this bar along the margin of the gum, as already described, and then attach each of the deviating teeth to it, by means of circular India rubber bands cut from a pipe or tube; these bands are first slipped over the tooth, then stretched under the bar, to be brought up on the other side and reattached to the tooth, by which means they have a firm, double hold and traction. Nothing need be added to show that these strong, elastic bands thus supported, accomplish the work of bringing forward the teeth in a manner at once simple and easy. In this case, as in the last, I retain the restored teeth in their place, by readjusting the gold plate, having first, however, added to it a kind of supplement extending up to their inner face, and carefully adapted to their posterior and irregular surface. This plate, secured as before, and with the supplemental plate resting against the restored teeth, checks their tendency to grow inwards, and thus maintains them in their proper position.

Case IV.—The next case is where the same front teeth, in-

stead of all, being within the dental ridge, have grown irregularly—some within and others without, or what is called zig-zag. In this case, I naturally use about the same apparatus as before, with this difference: that the flattened wire or bar, is made smaller and more elastic, and can be lengthened or shortened by means of screw-nuts. The teeth which grow inwards are brought outward by means of India rubber ligatures attached to the band. I preserve these teeth in their places, by striking up a fine, thin gold plate over the backs of the six front teeth, extending down from one-fourth to three-eighths of an inch, and running over the cutting edges about one-sixteenth of an inch. This plate, made of soft ductile gold, should be carefully adapted to the inequality of the teeth, and may be generally kept in its place by the mere effect of suction, or on the principle of atmospheric pressure; but where atmospheric pressure is not sufficient, with the ordinary shape of the plate, I modify it (the plate) by making a small air-chamber in it, which I have generally found to answer the purpose. Another way of keeping the plate in its place is, to let it extend back as far as the first bicuspid, and solder a tube to it on each side, with the mouth opening against these teeth; into these tubes is inserted a piece of hickory wood which swells enough to afford a sufficient support.

Case V.—The last case I have to mention—though, if there were time, I might mention many others—is very simple, but still is not without importance. It is that of

Bringing forward a lateral incisor.—The skeleton cap, or yoke, is fitted to the two strongest molars; one end of the gold wire, about the size of a knitting needle, is then soldered to the back part of the yoke, and carry the other end forward to the deviating tooth, to which I attach it by means of a silk or India rubber ligature. The elasticity of the wire, which, of course, is hammered hard from the soldering point, is sufficient to bring the tooth back to its place in a short time. The apparatus for keeping this tooth in its place, is also applicable to several other cases, as the intelligent hearer will perceive. It consists simply of a thin gold plate, curved over so as to take

hold of the front teeth by their cutting edge, and kept in its place by this hold, and by suction.

I have thus far spoken chiefly of the irregularity of the upper incisors; but one of the commonest cases I have to treat, is that of the

Protrusion of the eye-teeth.—My mode of treatment is, substantially as follows:—If the teeth are so crowded that there is hardly sufficient room for the canine to come down to its place, I bring the incisors forward in the manner already described, and in this way easily obtain the necessary space by an expansion of the dental arch. But if the space wanting is too great to be obtained in this way—in other words, if the bicuspids and incisors touch, or nearly touch each other—I extract one of the former; and then, if the tooth is so high up, that in waiting for it to come down we are likely to lose the space thus obtained, I construct an apparatus for hastening the descent of the tooth and guiding it to its place. This is applied as follows:

1st. I adjust the yoke or skeleton cap, already described, to the molar teeth, which I prevent from being loosened or displaced, by means of the gold plate moulded to the roof of the mouth. I then solder *one end* of a gold wire to the back of the skeleton cap, and having hammered the rest from the soldering point, so as to make it elastic, I curve it inwards towards the eye-tooth, against which the *other end* of the wire presses gently, operating as a spring, and aiding and directing the tooth to its place. If the protrusion be such as to require it, the wire may be crooked where it touches the eye-tooth, so as to bring it both inwards and downwards.

Another interesting case is that of the

Protrusion of one or more of the lower front teeth.—In this instance, if the teeth are too crowded, I extract one of the incisors, and then bring the others together by means of India rubber rings slipped over the teeth on each side of the space thus obtained. I then form a cap, by bending a piece of flattened gold wire, or plate, over the cutting edge of the irregular tooth, extending down almost to the gum on each side, and thus

embracing the whole crown. The ends of this cap where they approach the gum are turned up so as to form small eyelets or hooks. The cap is kept in its place by means of a silk ligature wound tightly round it, which silk is kept from slipping down to the gums by the hooks or eyelets. Having adjusted this simple mechanism, and fitted a skeleton cap to the molars used for support, I run a spiral spring from the irregular tooth to the back of this cap, attaching it at each end by little hooks. The operation of this spiral spring brings the tooth back to its place steadily and promptly. If the spring interferes too much with the tongue, or prevents articulation, I pass a gold wire through it, curved inward to the form of the gum, and soldered at one end upon the skeleton cap. The spiral spring thus curved leaves the tongue entirely free, while it operates as perfectly upon the wire as if it were run directly from the tooth to the skeleton cap.

I have thus, gentlemen, given you, as clearly as is possible for me to do in a public lecture, some of the results of my labors in the way of regulating teeth. If I have failed to make myself perfectly clear, I shall be happy to make any explanations which may be required of me. For, in my view, gentlemen, ours is a science far too noble in its character, and involving far too many general interests, to be hampered with any monopolies. A patent for a particular mode of regulating teeth, seems to me as absurd as a patent for a particular mode of setting a bone or curing a fever. There is something almost sacrilegious in the very idea. Everything we discover for the benefit of human kind, should be known and read of all men. It should be published in the streets, and proclaimed from the house-tops, that thus we may humbly imitate that generous Providence, which sends its rain alike upon the just and the unjust, and scatters its light, broad-cast, over the whole face of the earth.

ARTICLE XIV.

On the Development of the Teeth, and on the Nature and Import of Nasmyth's "Persistent Capsule." By Thomas H. Huxley, F. R. S.

I am desirous of setting forth in the course of the following pages, as concisely as may be, the principal results to which I have been lately led in the course of working over the development of the human and of some other teeth. I have directed my investigations, not to the general phenomena of dentition, our knowledge of the course of which, firmly established many years ago by Professor Goodsir, has not been affected, so far as I am aware, by any subsequent investigations, but to those points of structure and development upon which every writer, from the time of John Hunter to the present, seems to have formed, with more or less plausibility, an opinion of his own, different from that of all others.

I must suppose such a knowledge of the general course of development of the teeth as may be found in the ordinary hand-books of physiology—my limits allowing no unnecessary disquisition—and proceed at once to the questions whose discussion I am about to attempt. These are, firstly: What are the three structures which are concerned in the development of the teeth, viz. the pulp, the capsule, and the enamel organ, *morphologically*, or in relation to the parts of the mucous membrane from which they are developed?

Secondly: What is the relation of the dentine, the enamel, and the cement, to these organs?

Thirdly: What is the relation of the histological elements which enter into the composition of the soft parts, to the dentine, enamel, and cement, which are formed from or within them.

These questions, I think, involve all the essential points connected with the teeth. Having endeavored to answer them, I shall inquire with what other organs of the animal the teeth correspond.

1. *The nature of the pulp, the capsule, and the enamel organ, with relation to the mucous membrane from which they are developed.*

The teeth are developed in two ways, which are, however, mere varieties of the same mode in the animal kingdom.* In the first, which may be typified by the mackerel and the frog, the pulp is never free, but from the first is included within the capsule, seeming to sink down as fast as it grows.

In the other the pulp projects freely at one period above the surface of the mucous membrane, becoming subsequently included within a capsule formed by the involution of the latter; a marked instance of this mode of development occurs in the human subject. The skate offers a sort of intermediate stage.

If the thick and opaque, colored, mucous membrane of the jaw of the mackerel be torn away, and the alveolar edge of the jaw be then examined with a low power, minute germs will be seen to be imbedded in the substance of the jaw, among the large, fully-formed teeth. It was an oval mass, about $\frac{1}{60}$th of an inch in long diameter; its upper part was roofed as it were by the epithelium of the gum; its sides were constituted by a continuation of the basement membrane of the mucous membrane of the mouth; within this was a homogeneous substance, containing numerous oval or rounded nuclei, about $\frac{1}{5000}$th of an inch in diameter, and continuous with the lowest layer of the epithelium of the mouth. In the centre appeared a large conical mass, nearly as long as the sac, the proper tooth pulp. Pointed above, it widened below, and then gradually contracted again, so as to form an almost hemispherical lower extremity, which was united to the base of the sac by a narrow neck. In the upper part of the papilla the proper dental tissues had already begun to make their appearance; but below, a delicate membrane formed its outer boundary, and this passed directly into the basement membrane of the sac.

* For the purposes of the present examination, I have taken the skate, the mackerel, the frog, the calf, and man, as accessible specimens of each of the great divisions of animals possessing teeth.

It is clear then, that in this case the papilla is wholly a process of the derm (or that which in a mucous membrane corresponds to it) outwards, while the sac is a process inwards of the same structure; and that the homogeneous substance, with its imbedded nuclei between the two, corresponds with the epidermis or epithelium.

In the frog the same relations essentially hold good; the young teeth are here developed in minute sacs, which lie at the bottom of the dental groove in the upper jaw. I could never detect any free-projecting pulps (nothing, therefore, corresponding to the papillary stage in the human tooth,) but the smallest and youngest rudiments of the teeth I found were oval or rounded sacs, $\frac{1}{180}$th of an inch long, containing an oval papilla, about one-fourth shorter. Externally, these were bounded by a strong structureless basement membrane, which enclosed a homogeneous substance containing nuclei in its cavities. These were rounded, and very close together, next to the basement membrane, but became transversely elongated in the inner layers and next to the pulp. This last was bounded by a structureless membrane, which at its narrow base became continuous with the basement membrane of the capsule.

In the frog, then, the relations of the pulp and of the capsule are the same as in the mackerel.

In the skate, as is well known,* the young teeth are developed in longitudinal rows within a deep fold of the mucous membrane of the mouth, behind the jaw. So far as my examinations go, however, I find that this is not a mere simple fold, such as it has been described to be; but its two walls behave just in the same manner as those of the primitive dental groove in man—that is, they become closely united in lines perpendicular to the direction of the jaw, so that partitions are formed between every two rows of teeth—transverse partitions again stretch between the separate teeth of each row, but these did

* See Blake's "Essay," &c. 1801, in which the essential peculiarities of the development of the teeth in the shark and skate, and their mode of advance, are very well pointed out. He refers to Herissant and Spallanzani as having anticipated him.

not appear to me to be complete, terminating by an arcuated border below. Each longitudinal canal, therefore, answers to a single elongated mammalian follicle, or to that prolongation of the alveolar groove from which the posterior permanent molars are formed in man (*see* Goodsir,) only the process does not go so far as in this case, the separate capsules remaining imperfect anteriorly and posteriorly. The lateral walls of the capsule, however, seem to me to have as much (or as little) "organic connection with the pulp and attachment to its base" as in man, and the process seems to correspond with something more than the "first and transitory papillary stage of the development of the mammalian teeth."*

Each pulp is invested by a very distinct basement membrane, whose continuity with that of the mucous membrane of the follicle is very obvious. The epithelium of the follicle forms a thick layer, which sometimes, when the upper wall is stripped back, adheres to it—sometimes remains as a cap investing the papilla. Even when the latter does not take place, shreds of the epithelium frequently adhere to the papilla in the form of irregular, more or less cylindrical nucleated cells; as often, however, the papilla, whether any of the proper tooth substances be formed or not, has nothing adherent to it, but presents a perfectly smooth sharp edge. Other portions of the epithelium, particularly towards the bottom of the follicles, are more or less altered and irregular, *frequently assuming the form of a stellate* tissue.

In the skate, then, the follicle is an involution of the derm, the papilla is a process of it, and the epithelium between the two becomes metamorphosed sometimes into a peculiar stellate tissue. The same essential relations prevail as before.

In man, some confusion has prevailed with regard to the homology of the various component parts of the tooth sac, though they might be readily enough deduced from the mode of development of the sac; however, it is, I think, not at all difficult to obtain perfect demonstration upon this subject.

* See Owen's "Odontography," p. 15.

If a young tooth capsule be opened (say of a fœtus at the seventh month,) whatever care may be exercised, it will always be found (Hunter, Bichât) that a space filled with a fluid exists between the inner surface of the capsule and the outer surface of the pulp—*the two are perfectly free from all adherence to one another*—the only substance between them, besides the fluid, being a more or less abundant whitish matter which sometimes adheres to the one and sometimes to the other *(see* Goodsir, *l. c.)*

If the tooth be very young, a structureless membrane, the m. preformativa of Raschkow (the basement membrane of Bowman,) may be traced over the whole surface of the pulp, or if calcific deposition have already commenced, it may be found readily enough at any rate in the lower unossified part; and it is not at all difficult to trace this in perfect continuity on the walls of the capsule—in fact into its basement membrane. The best way of seeing this is by detaching the whole sac from its alveolus, and then, laying it carefully open in a watch-glass, turn the capsule carefully back, transfer the whole to a glass plate, and cover it with a piece of thin glass. The continuity of the basement membrane of the pulp with that of the capsule is now evident enough under the microscope.

The wall of the capsule is often folded, and sometimes I have noticed villous processes, such as those described as vascular by Dr. Sharpey.* Not unfrequently the basement membrane of the capsule is quite naked, but I have sometimes observed a lining of short cylindrical nucleated epithelium cells upon it.

I have said that a whitish substance lies between the basement membrane of the pulp and that of the capsule. It is delicate and friable, but frequently forms a more resisting layer towards the pulp. On this surface I have found it to be composed of a layer of elongated, more or less cylindrical epithelium cells $\frac{1}{1000}$th of an inch in length, with or without nuclei, and adhering together in the direction of their short diameters. On the surface towards the capsule, on the other hand, this

* See also Goodsir, *l. c.* p. 17. In a child at birth "the interior of the sac had a villous, highly vascular appearance, like a portion of injected intestinal mucous membrane." See also p. 25 of the same admirable essay.

substance is composed of irregular cells united into a network, and very similar to those which have been described in the skate. The structure of this substance, and its relation to the basement membrane of the pulp, and of the capsule, clearly indicate that it is nothing more than the altered epithelium of these organs.* It is the so-called "*enamel organ*" of authors, and very wonderful figures and descriptions indeed have been given of it in various works upon the teeth. The only detailed,† and at the same time, as it seems to me, completely accurate account I have met with of this so-called enamel organ, is the very clear and admirable description by Mr. Nasmyth, contained in his posthumous work, "*Researches on the Development, Structure, and Diseases of the Teeth,*" 1849. The merits of this gentleman have met with such scant justice that I cannot do better than let them speak for themselves in this place; those who work over the subject hereafter will not fail, I think, to acknowledge them as I have done.

Development of the Formative Organs of the Teeth, Follicular stage.—"At an early period of the follicular stage when the apex of the papilla rises above the level of the surrounding fence of mucous membrane, a small quantity of whitish matter may be detected in the groove between the papilla and the follicle—this is the *enamel organ.* Not unfrequently the whitish matter has the appearance of granules which seem to have been separated from the surface of the follicle. These granular masses have

* Goodsir ("Edin. Med. and Phys. Journal," 1839) and Todd and Bowman ("Physiological Anatomy,") state very distinctly that the pulp is an ordinary papilla, and the capsule an involution of the mucous membrane, and the latter justly described the membrana preformativa of the pulp as a basement membrane (p. 175,) but they consider the "stellate tissue" and the enamel organ to be the "wall of the sac itself." Kölliker ("Mikr. Anat.," p. 101) expresses the same opinion.

† Mr. Tomes ("Lectures," &c., 1848) appears to me to have described the enamel organ very accurately, but he has, I think, failed to distinguish the proper enamel organ or epithelium of the sac from the submucous cellular tissue—the latter is his "reticular stage of the enamel pulp," the former his "second stage" or "stellate tissue," while what he calls the "transition part," p. 99, is, I think, the dense superficial layer of the capsule, very well described by Mr. Nasmyth (*vide infra*) as "the internal lamina of the dental capsule."

Professor Kölliker ("Mikr. Anat.," p. 99 B) appears to me to have fallen into the same error.

a pearl white aspect, and are soft and friable. Under the microscope they are seen to be composed of cells which separate from one another upon the slightest compression. The cells offer considerable variety in respect of size and shape, some being small and round, others large and flattened, and furnished at one extremity with a delicate prolongation; while others again are elongated and narrow, and have a defined and regular margin. They contain nuclei and nucleoli, and are covered on their interior by minute granules, which are also found in considerable abundance in their interstices."—p. 104.

"In the numerous examinations which I have made of the stages of growth of the teeth here described, the enamel organs did not appear to me to be attached either to the papilla or to the surface of the follicle. This may probably arise from the circumstance that all the embryos which I dissected had been kept for some time in diluted spirits of wine."—p. 105.

He then quotes Raschkow's account of the structure in the lamb and calf, and goes on to say,—

"In my own investigations made with the aid of one of the best microscopes of modern construction, and with a magnifying power of one-tenth of an inch focal distance, I found the enamel substance to be composed of cells of three different kinds.

"The first kind of cells are found in the interior of the organ, and compose its loose, soft, and easily compressible texture. They are flattened and triangular in form, and connected to adjacent cells by means of delicate filaments prolonged from one of their angles. These appendages have no analogy with the filaments of areolo-fibrous tissue, as declared by Raschkow. I have seen them in connection with the cells of other tissues, and the error on the part of this observer must have arisen from the use of low microscopic powers.

"The second kind of cells are oval in shape, and form an envelope to the preceding: they are situated both upon the superficial and deep aspect of the latter.

"The third kind of cells occupy the deep stratum of the enamel organ, lying in contact with the dental papilla. They are narrow and oblong in shape, and are arranged closely side by side; one of their extremities being in relation with the papilla, the other being directed outwards. They are firmly connected together, and have a radiated position in respect of the papilla. It is to the layer formed by these cells that Raschkow has assigned the name of enamel membrane. Taking this view of the construction of the enamel organ, I cannot perceive any grounds for the division of it into two parts suggested by

the description of Raschkow. It is obviously nothing more than a single organ, and the difference in the form and arrangement of the cells must simply be regarded as a transition of the first and second kinds into those of the third—the latter being in the state of preparation for the reception of the calcareous salts.

"The mucous membrane which rises in the form of a ring fence around the papilla developed from the dental groove is the future *dental capsule.* At an early period it is difficult to determine to what extent the internal surface of the growing follicle differs from mucous membrane. That it does so may be inferred from the change in function which it assumes; and at a later period, when the follicle is about to close, the difference in its organic character becomes strikingly obvious. For example, it is white, silvery, loose, and rugous, and easily falls into folds, and, under the microscope, offers the appearance of a number of minute cells possessing characters widely different from those of the epithelium.

"A portion of the internal lamina of the dental capsule, placed under the microscope, shows it to be composed of layers of cells loosely arranged, and separated by interspaces equal to half the diameter of the cell. The cells are oval in shápe, and provided with one or more distinct nuclei, and they contain in their interior a small quantity of granular matter. The internal lamina of the dental capsule maintains but a slight degree of adhesion with the enamel organ, and possesses no vessels. Subjacent to it is a network of blood-vessels, supported by a web of areolo-fibrous tissue formed by the interlacement of fine homogeneous filaments, among which nucleated cells are not unfrequently observed."—p. 107.

Saccular Stages.—When the sac closes—

"The space between the pulp and the sac becomes filled with a fluid secretion which distends its cavity, and often produces a conspicuous enlargement in the situation of the tooth."—p. 108.

"On the part of the capsule corresponding with the sides and neck of the crown is a flat portion of the enamel organ, which is destined to the formation of the enamel in that situation. This lamina has a well defined inferior border at a later period in the growth of the enamel organ; the appearance which it presented of a gelatinous mass is lost, and the substance contracts into a membranous layer. At this time also the prominences from the internal surface of the capsule have enlarged, and have become vascular and more closely adherent to the enamel organ. Some writers have inferred from this appearance

that the enamel organ itself becomes vascular,* but this is not the fact; it is simply that portion of the capsule which lies in contact with the enamel organ that presents the vascularity referred to.

"The dental capsule being originally, as we have seen, a production of the mucous membrane of the alveolar groove, is attached by its external surface to the neighboring soft parts by means of loose areolo-fibrous tissue. Blood-vessels ramify very freely in this tunic, and from the interlacement which they then form, numerous capillary loops are given off, which extend into the superficial portion of the membrane. These vascular loops are separated from the enamel organ by a delicate layer of cells, the characters of which have been already explained.

"Not the least interesting of the features attendant upon the development of the teeth is the relation which the capsule bears to the pulp and to the tooth at various periods of its growth. In the follicular and early periods of the sacular stage, previously to the commencement of the formation of the ivory, the capsule is continuous with the base of the dental papilla;† and at a subsequent period, when the ivory of the crown forms a complete covering to the pulp, the same arrangement takes place. But at a more advanced stage in the growth of the tooth, when its formation has proceeded beyond the limit of the crown, the capsule attaches itself closely around the neck, and the connexion of the two structures is so firm, that every attempt to effect their separation generally results in the laceration of the membrane. The continued growth of the tooth carries the capsule upwards with the rising alveolus to the under part of the gum, which now stretches over it; when pressed upon by the surface of the crown, it becomes atrophied and absorbed. No portion of the capsule seems to pass down into the alveolus."—p. 110.

Everything that I have seen confirms this admirable description as to matters of fact, and the only objections I shall have to offer are to certain of Mr. Nasmyth's conclusions.

In man, then, as in the skate, the mackerel, and the frog, the tooth-pulp is a dermic process bounded by its basement mem-

*Raschkow, in a note appended to his Researches, remarks that he has observed the enamel organ to receive blood-vessels in certain parts, and believes the parenchyma of the organ to be pervaded by capillary vessels. The conclusion which he deduces from this observation is, that the enamel organ was from the beginning joined to the capsule.

†It passes upwards over it, forming a distinct envelop, separated from the layer of mucous membrane externally.

brane; the capsule is an involution of the derm, bounded by its basement membrane; and the epithelium of these organs lies between them, having in this case received the name of "*enamel-organ*," from the supposition that the enamel was developed by the calcification of its elements. Of this, however, I shall speak below.

There is an important difference between the dental sac of the calf and that of man, which has given rise to much confusion.

The "actinenchymatous" tissue (Raschkow) of the former does not at all correspond with the stellate tissue of the latter, as has been assumed by all writers. In fact, in the calf the wall of the capsule is separated by only a very narrow space from the surface of the pulp, and this space is completely filled up by elongated cylindrical epithelium cells, which glue the capsule to the pulp. Between the basement membrane of the capsule and the alveolar wall, indeed, there is a very wide interval (see Owen, *l. c.*, pl. cxxii, *a.* fig. 9 *e*) occupied by Raschkow's actinenchyma. This, however, is nothing more than the loose submucous cellular tissue of the gum, similar to that so well described by Mr. Nasmyth in the wall of the capsule of man. Professor Owen says (*l. c.*, Introduction, p. lix,) that "no capillaries pass from the capsule into the actinenchymatous pulp of the enamel." But those which I have examined do not bear out this statement; in fact, this tissue presents one of the most beautiful and obvious vascular networks with which I am acquainted.*

The true homologue of the "enamel organ" in man therefore, in the calf, is not the actinenchymatous tissue, but the thin layer of epithelium between this and the pulp. The general relations of the different dental organs are, in other respects, the same in the calf as in man.

I may now proceed to the second question. *What is the relation of the proper dental tissues to the three organs of the tooth capsule?*

The answer is shortly this. Neither the capsule nor the

* Blake, who wrote in 1801, mentions the vascularity of the "spongy" outer membrane of the tooth sac in the calf; he says it is "very vascular."—p. 81.

"enamel-organ" take any direct share in the development of the dental tissues, all three of which—viz. enamel, dentine and cement—are formed beneath the membrana preformativa, or basement membrane of the pulp. In proof of this assertion, I have to offer the following facts:—If in a human fœtus of the seventh month, a dental capsule (say of an incisor) be treated as I have above described, it will generally happen that the surface of the young tooth-cap appears quite smooth under a low power; or it may be that a few of the elongated cells of the "*organon adamantinæ*" adheres to it. In any case the adhesion is loose, and these cells may be readily detached. Under a higher power the surface of the upper part of the ossified cap appears reticulated, the meshes being about 1-5000th of an inch in diameter. At the lower part, where only a thin layer of dentine is formed, this appearance is less distinct, but the surface is somewhat wrinkled, the wrinkles sometimes forming large and pretty regular meshes. Viewed in profile, these wrinkles are seen to be produced by the folding of a delicate structureless membrane, which is continuous below with the *membrana preformativa.* Towards the apex the tooth substance is almost too opaque to make much out of it; the yellowish enamel, however, can generally be distinguished from the dentine.

Now, while the object is under a low power of the microscope, add some strong acetic acid; a voluminous transparent membrane will immediately be raised up in large folds from the whole surface of the tooth. If the acetic acid be pretty strong, it soon softens the substance of the tooth a little, and then a slight pressure exhibits very distinctly the *ends of the enamel fibres under this membrane.* There can be no question about this fact, as I have been able to demonstrate it to the satisfaction of my friends, Mr. Busk and Professor Quekett. The membrane is about 1-2500th to 1-1600th of an inch thick, perfectly clear and transparent, and under a high power exhibits innumerable little ridges upon its outer surface, which bound spaces sometimes oval and sometimes quadrangular, and about 1-5000th of an inch in diameter. Furthermore, at its lower edge this membrane gradually loses all structure, and passes

into the *membrana preformativa.** *In fact it is the altered membrana preformativa itself*, no trace of which has ever yet been found in the locality in which, according to the prevalent hypothesis upon the development of the teeth, it should exist—viz. between the enamel and the dentine.

In the calf † a similar membrane may be denominated, but it is much more delicate, and I have not seen the peculiar areolæ upon its surface.

In the frog, in which the layer of enamel is very thin and structureless, the membrane may be very readily demonstrated by the action of dilute hydrochloric acid, which in this animal, as in the mackerel and skate, dissolves out the enamel layer at once, while it only acts gradually upon the dentine.

In all these animals I have examined the smallest teeth I could find perfectly entire, without any rough mechanical treatment, which I should think would destroy the delicate membrane.

In the frog, its surface is in parts *reticulated as in man;* in the mackerel and skate I have been unable to find any such reticulation. In both these the enamel forms a conical cap of almost structureless or obscurely fibrous substance at the extremity of the tooth, while the layer upon the body of the tooth is very thin.‡ In the skate it is thick, dense, yellowish, structureless, and perfectly smooth; but in the mackerel it is developed upon the lateral edges of the young tooth into sharp notched processes; lines stretched across the body of the tooth from these, not only unlike the contour lines one sees on the enamel of a young human tooth.

A membrane, corresponding with that which has been de-

* It is stated, by all the writers on the subject whom I have consulted, that the membrana preformativa is the first portion of the tooth which ossifies. This statement, however, is never supported by evidence; and my own observations lead to precisely the reverse conclusions.

† *See* Hassall, Micr. Anatomy, p. 318.

‡ As this "dense exterior layer" may be dissolved out by dilute acid, leaving the "membrana propria of the pulp," which is very much thinner, standing, it is quite clear that it is not "formed by the calcification of the membrana propria of the pulp, which therefore precedes the formation of ordinary dentine." (*Odontography*, p. 17.) Why should it not be called enamel? It has at least as much claim to this title as that of the frog.

scribed in the human subject then, is also found in members of each of the other groups of vertebrata which possess teeth. In the human subject, and in mammals, this membrane was discovered, and very accurately figured and described, fourteen years ago (that is, in January, 1839, in the Medico-Chirurgical Transactions,) by Mr. Nasmyth, under the name of the "persistent capsular investment." No question has ever been raised as to the right of Mr. Nasmyth to this discovery; but it is remarkable, that neither in Professor Owen's Odontography, which is the first subsequent work upon the teeth, nor in Professor Kölliker's Mikroskopische Anatomie, which is the last, is there any notice of Mr. Nasmyth's discovery. Kölliker, indeed (*l. c.*, pp. 76, 77,) describes the structure as "schmelzoberhäutchen," but his description is not so good as that of Nasmyth, and he states that it does not extend over the cement—Nasmyth having shown that it does. Unfortunately, however, the latter, like all who have succeeded him, misled by the supposed mode of development of the enamel from the enamel-organ, imagined that, as the "persistent capsule" was outside the enamel it could be nothing else than the membrane of the dental capsule; and hence the erroneous description of the adherence of the latter to the crown of the tooth, which I have already quoted. Had he chanced to examine a tooth before its eruption, he would at once have seen the incorrectness of his hypothesis.

Since then this "Nasmyth's membrane" is identical, on the one hand, with the persistent capsule which lies external to both enamel and cement, and, upon the other hand, with the preformative membrane of Raschkow or otherwise with the basement membrane of the pulp; it is clear that all the tissues of the tooth are formed *beneath the basement membrane of the pulp;* in other words, they are all true dermic structures—none epidermic.*

* That the enamel is not formed directly from the enamel pulp might have been concluded from Professor Goodsir's observations (*l. c.*, p. 25.) He says, "The *absorption* (in the granular matter) goes on increasing as the tooth substance is deposited, and when the latter reaches the base of the pulp, the former disappears, and the interior of the dental sac assumes the villous vas-

The third problem was, the relation of the histological elements of the soft parts (that is, as we now see, of the pulp) to the dentine, enamel, and cement.

Three theories have been prevalent as to the mode of development of the dentine. The first, the old *excretion theory*, need not be considered here, as it has been given up on all sides. The second, the Conversion theory, consists essentially in the supposition that the dentine is the "ossified pulp;" that the histological elements of the pulp become calcified and converted directly into the dentine—the arrangement of the elements of the dentine depending upon that of the elements of the pulp. This is the doctrine maintained by Blake, Schwann, Nasmyth, Owen, Tomes, Henle, Todd and Bowman, and, more or less doubtfully, by Kölliker and Hildebrandt.* The third theory is that contained in the remarkable phrase of Raschkow.

"Postquam . . . fibrarum dentalium stratum depositum est (quoted by Schwann) idem processus continuo ab externa regione internam versus progreditur *germinis dentalis parenchymate materiam suppeditante* . . . . Conversæ fibrarum dentalium flexuræ quæ juxta latitudinis dimensionem crescunt, dum ab externa regione internam versus procedunt sibi invicem appositæ continuos canaliculos effingunt, qui ad substantiæ dentalis peripheriam exorsi multis parvis anfractibus ad pulpam dentalem cavumque ipsius tendunt, ibique aperti finiuntur novis ibi quamdiu substantiæ dentalis formatio durat fibris dentalibus aggregandis inservientes."

The dentinal substance, that is, is deposited within the pulp beneath the membrana preformativa in definite masses (Raschkow calls them fibres, to which, indeed, under a low power they have a remarkable resemblance,) the gaps between which eventually constitute the dentinal tubules. This, if a name be wanted, might be called the Deposition Theory, and is especially char-

cular appearance of a mucous membrane. This change is nearly completed about the seventh or eighth month." It will not be said, however, that the growth of the enamel ceases at the seventh or eighth month.

* Dr. Sharpey, on the other hand, with characteristic caution, after citing the statements of some of the advocates of the Conversion Theory, adds, "We must confess that, after a careful examination of the human teeth, we have been unable to discover any of the above mentioned changes, except the enlargement of the more superficial cells of the pulp, and their elongations in the immediate vicinity of the dentine."—Quain and Sharpey, p. 988.

acterized by its asserting which the histological elements of the pulp do not enter *as such* into the dentine. The following description of the young dentine in the human subject holds good for all the animals that I have examined; and if it be true, I think the incorrectness of the Conversion Theory necessarily follows.

To justify my own method of procedure, however, I am necessitated to remark that I have been unable to verify the statement of Professor Owen (*l. c.*, Introduction, p. xxxix.,) that the teeth of man "will not yield a view of the cap of new-formed ivory and the subjacent pulp in undisturbed connection by transmitted light with the requisite magnifying power." On the contrary, I have found it sufficiently easy, by cutting off the half-ossified cusp of a young molar, or even by submitting an entire canine or incisor to slight pressure, to obtain a most distinct view of the pulp in undisturbed connection with the dentine, and in a profile view. Indeed, had other observers adopted this method, I do not think they would have been led to consider the lacunæ in young dentine, whose true nature was demonstrated by Raschkow, as metamorphosed nuclei of the pulp.

When the ossifying boundary of a tooth-pulp is examined in the way which I have here pointed out, it is seen that where dentification has not begun, the membrana preformativa is in immediate contact with the substance of the pulp, composed of a homogeneous transparent base, in which closely arranged "nuclei" are embedded. These are rounded or polygonal, apparently vascular; contain one or more granules, and are about $\frac{1}{2500}$th—$\frac{1}{3500}$th of an inch in diameter. Passing towards the ossifying edge, we see in the profile view a clear, more strongly refracting layer, gradually increasing in thickness, which begins to separate the proper substance of the pulp from the membrana preformativa. This is at first quite structureless to all appearance, both in this view and in one perpendicular to its surface. When it has attained a thickness of $\frac{1}{2500}$th of an inch, however, it acquires a sort of mottled appearance in the profile view, while superficially numerous very minute irregular cavities, about $\frac{1}{5000}$th of an inch apart present themselves. In a thick portion of the dentine ($\frac{3}{5000}$ths) these cavities are very

readily seen in the profile view to be elongated into canals; superficially they are rather larger; and as they run somewhat obliquely, it may very readily happen that, unless the focusing of the microscope be very careful, one will run into the other, and so produce the appearance of fibres described by Raschkow.

This young dentine is as transparent as glass. No trace of "nuclei" can at any time be discovered in it; the bodies which have been described as such being, as I have said, simply lacunæ; nor, if strong acids be used so as to dissolve out the calcareous matter, are any nuclei brought to light, though those which exist in the pulp became much more distinct, and even coarse, in their outlines. Again, if to a pulp thus treated, a weak solution of iodine be added, the nitrogenous substance of the pulp is immediately colored deep yellow, the nuclei themselves becoming brown; but the dentine remains pale, except that here and there a yellow process of the matrix of the pulp may be seen stretching a little way into one of the canals of the dentine. I have only observed this, however, once. I believe that these facts afford sufficient demonstration that the pulp is *not* converted directly into the dentine, and that, the structure of the latter does not depend upon the calcification of pre-existing elements.

I am the more satisfied with this negative evidence, as in young bone it is easy to demonstrate the "nuclei" in the lacunæ by the aid of acids, &c.

As to whether the perpendicularly crowded "nuclei" of the pulp under the dentine disappear, or whether they are merely pressed inwards, I cannot pretend to offer a decisive opinion. The former supposition, however, if we may judge by the analogy of bone, appears more probable. Dentine, in fact, might be considered as a kind of bone, in which the lacunæ are not formed in consequence of the early disappearance of the nuclei, whose persistence for a longer or shorter period appears to be the sole cause of their existence in bone.*

* I have here no space to enter into the discussion of the various hypotheses and assertions, respecting the development of the dentine, made by the various authors, whose names I have cited. I trust it will not on that account be supposed that I have neglected to make myself acquainted with them. But there are two statements to which I must refer in confirmation of my own view.—

Still less can the enamel be produced by any *conversion* of a cellular structure. Between it and anything which can be called a nucleated cell it has on the outer side Nasmyth's membrane; on the inner, the layer of dentine, which in man is formed before it. The fibres of which it is composed are structureless, and almost horny; and I think we must be content for the present to consider its existence and its structure as ultimate facts, not explicable by the Cell Theory. It is particularly worthy of notice that in the skate the dermal teeth or plates on the upper surface of the head have as distinct a layer of enamel as those of the mouth, though in this case there is most assuredly neither rudimentary capsule nor "enamel organ."

In a morphological point of view, the relations of the cement show it to be homologous with the enamel. In a very beautiful section of a human tooth from Mr. Busk's cabinet, the upper portion of the cement exhibits in places a very distinct transverse striation, resembling its perfect enamel. But the transition of the one structure into the other is best exhibited in the young calf by the cement of the fang of a molar which had not cut the gum. Here it is a white substance, from which generally a fitting section can be cut only with some difficulty, in consequence of its friability. The layer is about 1-40th of an inch thick, and consists of an external delicate structureless Nasmyth's membrane; internal to which three-fourths of the thickness of the layer are formed by parallel fibres 1-5000th of an inch in diameter, quite structureless, and completely resembling enamel fibres, but absolutely enormous (as much as 1-60th of an inch) in length. These fibres were softened and rendered pale by the action of caustic ammonia. The inner fourth of the layer of cement was composed of an inextricably interlaced body of such fibres, united into a mass, which in some places was almost homogeneous, by calcareous salts, and containing here and there lacunæ 1-1600th of an inch in length, similar to those of bone. That this structure was the young cement is

The one is that by Dr. Sharpey already quoted; the other is the very just declaration (in italics) by Professor Kölliker (Handbuch, p. 386,) that "*the most careful investigation exhibits no trace of any elongation of nuclei*" in the peripheral cells of the pulp.

certain, inasmuch as no enamel is formed on the fang of the tooth, to say nothing of the presence of the lacunæ. On the root of the fang of the molar in front of this, which had cut the gum some time, and had come into use, the cement had the ordinary structure. It may be worth while to add that in these teeth the capsule, though closely connected with the outer surface of the fang, could be readily stripped from it, and then exhibited a layer of epithelium upon its inner surface, showing clearly that the cement was not derived from its ossification.

It may be concluded, then,—

1. The teeth are true dermic structures, formed by the deposit of calcareous matter beneath the basement membrane of a dermic papilla, or that which corresponds with one.

2. Neither the capsule nor the "enamel organ," which consists of the epithelium of both the papilla and the capsule, contribute *directly* in any way to the development of the dental tissues, though they may *indirectly*.

3. The histological elements of the pulp take no direct part (except, perhaps, eventually in the cement) in the development of the dental tissues, becoming either absorbed or being pressed in by the gradual increase of the latter. The Conversion Theory, is, therefore, as incorrect as the Excretion Theory, and the dentine is formed, not by ossification of the histological elements of the pulp, but by deposition in it, "parenchymate materiam suppeditante."

I have already exceeded my limits, and I must, therefore, dismiss my last point very concisely. The true homologues of the teeth in man are, I think, the hairs. As Hildebrandt says, "As the hairs in their bulb (sac,) so the teeth are developed in their capsules." The stage of the free papilla, which does not occur in the hairs of man, is absent in the teeth of the mackerel and frog, and, indeed, it would seem in the permanent dental capsules of man also.

Substitute corneous matter for calcareous, and the tooth would be a hair. The corticle substance of the hair contains canals not unlike those of the dentine; its relation to a dermal papilla is the same as that of the dentine;* for although it is univer-

* See Todd and Bowman, p. 175.

sally stated to be such, I think it can be shown that the hair shaft is *not* an epidermic structure but a dermic one.

Again, the so-called cuticle of the hair corresponds in all respects, except absolute and relative size, with the enamel—its inner layer with the enamel proper—its outer with Nasmyth's membrane. On the root of the hair the cuticle is not continuous with the proper epidermic cells, but with a structureless membrane, which occupies more or less distinctly the place of a *membrana preformativa.* The two root sheaths, again—true epidermic structures, but which do not enter all into the construction of the hair proper—represent the altered and unaltered portions of the "*enamel organ.*"

Hairs and *teeth*, then, are organs in all respects homologous, and true dermal organs. Under the same category, probably, will come feathers and the scales of fishes.

The nails, on the other hand, seem to be purely epidermic, at least according to Kölliker's account of their development (*l. c.*, p. 119;) and in that case they are the homologues of the root sheaths and enamel organs of hairs and teeth.

ARTICLE XV.

Risodontrypy.

This operation, as the drilling of the teeth is now termed, has given rise from time to time to a great deal of contradictory discussion, without either side arriving at any satisfactory conclusions. For our own part, we cannot discover any more favorable features in the *modernized* method of performing the operation than characterized the former. To sustain this position, we will remark that every case of perforating the gum and alveolus which has fallen under our observation, has, in a short time after, assumed the same condition as though it had been drilled under the free margin of the gum at first. The sero-purulent matter and blood escaping from the orifice in the tooth excites absorption of the thin process of

the border of the alveolus, and dissects the gum loose from the neck of the tooth, and escapes by that means at last, and the perforation of the gum heals as any other wound. Again, as the wound of the pulp by decay is always a direct and local cause of pain in a tooth, we cannot understand how making an additional wound with a drill, can render the tooth less liable to pain and disease. The advantage proposed to be gained by drilling through the gum, of shutting out the air and irritating fluids of the mouth from the pulp, does not seem to be worth considering, since the free margin of the gum covers the orifice in the tooth as securely as the perforated opening in the gum; and besides, an opening which would give free exit, either through the gum or under it, to the accumulating contents of the pulp cavity, would as well give ingress to air and the fluids of the mouth. As long as the pulp is in a normal condition, a large amount of blood circulates through it, but as soon as it is irritated by any cause, the determination of blood to it increases, and must extravasate where the pulp is wounded, or violent congestion, or engorgement of the pulp vessels and surrounding tissues ensues. Now, it would seem to us, that under such circumstances the nearer the artificial opening is made to the original wound, the better, because the blood and pus which accumulates at the extremity of the pulp cavity, as it is opposite that point that it is most often exposed, must regurgitate upon the pulp until it finds vent through the artificial opening, which regurgitation would soon break up the structure of that substance. This, to us at first view many years ago, induced us to tube the plug, but a short experience soon proved the fallacy of the attempted preservation of the pulp alive. A pulp never remains in a stationary condition; when wounded, suppuration soon sets in, and absorption and sloughing takes place, or fungous granulations are thrown up, which keeps the cavity constantly full, and sometimes become so abundant as to fill the whole cavity of decay; and thus, as long as it is in the tooth, it is subject to change, and needs an external opening. That a tooth will give rise to pain when plugged over the pulp, seems now to be conceded on all sides; and on account, too, of the accumulating fluids in the pulp cavity, this suggests, at once, the operation of drilling an orifice, which shall be less objectionable than the former cavity. It requires no stretch of the imagination to see the propriety of this procedure, as a method of giving temporary relief from suffering; but, if we stop at this point

in our efforts to save a valuable organ of mastication and appearance, we deserve less credit for our skill than belongs to us for duties well performed, and that looks into the future for the test of merited reward. This operation, in the majority of cases, is only quieting the patient's anxieties until the destruction of the organ is irretrievably effected.

Again, in perforating below the margin of the gum, a number of membranes, differing very much in character, are wounded; first, the mucous membrane; second, the alveolo-dental membranes; third, the dentine and the internal membrane of the pulp cavity. Now, this makes a very severe wound, so far as the nature of the tissues of the parts are concerned, and to restore it to a reasonable state of health, some claim for the process, that ossification of the pulp takes place outside of the point at which the pulp cavity is perforated, and that the orifice drilled through the tooth also becomes filled up with ossific matter, and in this way the life of the tooth is saved, and the surrounding parts become whole. We see cases of drilled teeth every day, and have as yet seen no traces of such changes having taken place, nor can we at present regard the matter as deserving serious reflection. We very frequently find granules of ossific matter occupying the pulp cavity, enveloped by a thin vascular and sensitive membrane, similar to periosteum, when extirpating the pulp, but never regarded this as resulting from any effort of nature to change the character of the pulp from its sensitive and vascular condition to that of an ossific substance, to ward off the consequences of exposure, to the liability to disease or suffering. We have frequently found such granules on breaking open sound teeth, and in cases where the pulp had become exposed by rapid decay. We recollect sending a specimen of such ossification in the pulp cavity—but not united to it—some years ago, to Prof. C. A. Harris, of Baltimore, the reception of which he acknowledged in the American Journal, at the time. This specimen, as well as many others, was discovered fifteen years ago, while making experiments to *fossilize* the pulp. These anamolies are the results of modified functions in the pulp substance, which we, as yet, have no means of rousing up or controlling. Every effort, therefore, to preserve the pulp alive, or to cause it to assume or take on a modified state of existence to that end, is but experimental. It has been claimed also for this operation, that it is founded on *true surgical principles.* "*Surgery, properly*, is the act of healing

by manual operations; or, that branch of medical science which treats of manual operations for the healing of diseases or injuries of the body," and "*a solution of continuity*, is any division of parts previously continuous, as a wound or a fracture," &c. Now, if a tooth's pulp is wounded by a loss of the bone, by decay or other cause, is it surgery to make another wound of greater extent than the former, involving the same tissue, as well as other important ones? This is not treating the *wound* first made by manual operation, but making *another*. Now, where is the surgical principle that is to promote the healing of the second wound? Surgery can only place a wounded part in such a condition as best to favor the operations of nature in her efforts to restore a breach of continuity. If an organ or limb is irrecoverably injured, and we cannot, by directing our manual or surgical operations to the *wound itself*, hope to have it restored, and it is a part that is not of vital importance to the economy, it is our duty to extirpate it entirely, nay, our only remedial means. This is *nature's* surgery, so far as it applies to cutting organs loose from the body, when she cannot bring sufficient vital force to operate in the restoration of the wounded member. Does not this apply to the exposed or injured dental pulp, in the mass of cases, if not all, sooner or later, whether plugged or drilled or left exposed without a plug?

This modern method of operating was marshalled before the profession with a strong advance and rear guard, as the ultimatum of scientific treatment of the dental pulp, only lacking for its perfection a more extended experience, and care in its application. With due deference to all who are engaged in its practice, we would assert, that so far as we have been able to observe the results of the method, it is the most pernicious that has yet been devised. There are very few cases in which it will well apply, as a *durable* operation for preserving a tooth, even if it had strong claims in favor of placing a tooth in a comfortable condition. It cannot be applied in deciduous teeth, on account of the pain it excites in its performance. It cannot be applied with any certainty with reference to impinging upon the most desirable point of the pulp in a molar tooth. Within a few days we have removed a plug from a superior first permanent tooth, after a month's suffering, which at last became intolerable, and found that the buccal nerves were dead, and the palatine living and in a high state of inflammation. This would have required to have been drilled on both sides; and, within two months, a patient

applied in great suffering from a first superior bicuspis, which had been drilled by one of its most eminent supporters, and upon removing the plug, it was found that the drill had entered the pulp cavity a little way above the neck of the tooth, and had passed out obliquely upwards and backwards into the alveolus. This tooth had been subject to a much longer period of suffering than is usual when alveolar abscess sets in. An instrument could be passed into the posterior opening under the gum, as well as under the gum and into the orifice on the buccal side of the tooth; notwithstanding this *thorough* drilling, there was an alveolar abscess at the extremity of the root. We do not cite this operation as one to condemn the method, when carefully applied, but to show what may happen in the hands of experienced operators. When all these cavities were well plugged, the irritation of the surrounding parts subsided, as well as the fistulous opening from the alveolar abscess, in the gum. There were many teeth in the same mouth that had been plugged over the pulp cavities—some before destroying the pulp, and some after—and they had not given rise to as much suffering altogether, as this single case. It is useless to drill a tooth where there is already an unhealthy condition of the pulp, and this is seldom met with when preparing a tooth for plugging, because patients rarely apply to us until they are compelled to do so from suffering, and if a portion of the pulp has been destroyed or become fungoid, drilling will never restore it to a normal condition, and in such a case it is depending upon the same principle for its success, as cases under the former method of drilling under the free margin of the gum. It is not durable, because when the pulp of a tooth becomes dead, the walls of the pulp cavity commence to soften, and in time the whole crown of the tooth, especially if it be a drilled one, discolors, and decay is the inevitable consequence. The only application that we can see for it is, where the pulps of teeth, with incompletely formed roots, are exposed, if drilling would preserve the pulp in a reasonable condition of health until the growth of the roots was completed, and the plug preserve the crown, we can understand how it could be rendered of great service in some cases, but we do not know of that as yet having been urged in its favor. It is not a safeguard against alveolar abscess, as nearly, if not quite all the cases we have seen, where the pulps had become dead, alveolar abscess had set in; we see abscess of course, every day, where teeth are as open as drilling could make them.

It seems very strange that such great difference of opinion and experience should exist between respectable practitioners, about the same mode of operating, where each are equally actuated to do the best that theory and practice could suggest for the good of their patients. It is doubtless true, that some practitioners are more easily satisfied than others, with regard to what constitutes success in treating teeth, when the pulps are exposed. The only way that such difference could be settled, would be by the relative success of a given number of operations under similar circumstances. As far as our experience goes, we have yet to see the first patient who would be willing to have the operation of drilling at all repeated, after they have had a pulp destroyed, removed and the root plugged. This opinion is corroborated by a number of my fellow practitioners, who have had considerable experience in the profession, as well as in this operation, after the different modes that have been suggested. The following case has some point in it:

Miss ———, aged 12 years, presented a case of drilling through the gum and alveolus of a lateral incisor, which had given rise to frequent attacks of pain, and at all times felt uncomfortable. There was a small spongy tumor on the gum opposite the drilled orifice, which had assumed a sensitive character, and prevented the use of the brush over that part of the gum, and was subject to slight bleedings. The tooth presented some discoloration and looseness in the socket. We refused to attempt its treatment, until she had seen and consulted her dentist, partly because he might wish to modify the treatment, and partly because we did not think it fair to risk the successful treatment of a case by plugging the root, where so much had been done to render the case difficult. She consulted her dentist, who at once pronounced it a failure, and that the tooth must be extracted. This, however, was not concurred in, when she returned and requested us to do what we pleased to the tooth, but not to extract it. The plug was removed, and a very small opening found to lead to the pulp cavity; the pulp had sloughed away as far down the root as to the drilled orifice; some bleeding was excited on touching the living remnant of the pulp. The tooth was left in this condition for one day, when the remaining portion of the pulp was destroyed, as far down the root as a small probe could be passed to remove it. A small pledget of cotton was forced under the free margin of the gum and into the drilled opening, as the gum was detached in this direction, and allowed to remain for one day,

when it was removed, and another larger introduced and left one day also. When it was removed the orifice could be distinctly seen, and as the gum remained elevated and arched over the orifice as high as the pledget of cotton raised it, this opportunity was taken to fill the orifice firmly with gold, first enlarging the mouth of the opening with a burhead drill, so that a larger plug could be entered than would push through; in this way the opening could be plugged firmly. The gum was now allowed to fall over the plug, as it did over the orifice. In a few days the root was plugged, and no irritation setting in, the external cavity was plugged in a few days after. This case was treated during January, 1853, and has been seen frequently since that time, and as yet presents no unhealthy appearance of the gum. The spongy tumor soon left, and the tooth regained a normal firmness in the socket; the appearance of the gum is healthy, and the body of the tooth less dark than before it was plugged in the root.

This case is but a type of many others of similar character from the same operator, as well as many other cases from operators of less repute for sound judgment and skill. Cases of drilling in the old way, prevailed like an epidemic twelve or fifteen years ago, but become less frequent from year to year, and we hoped would entirely disappear, until recently, when it seems to have gained increased energy under a new form, and notwithstanding the success attending the originators of the change, it is producing a great amount of suffering in bungling hands. J. D. W.

ARTICLE XVI.

Dentistry in France.

In France, in sober minded England, as unhappily in America, the interests of our profession have been seriously compromised, from its sacred domains having been invaded by hordes of illiterate and unprincipled charlatans. Not a few people, imposed on by such persons, look upon our science as hardly deserving the name; and the proportion of quacks is so great, compared with the number of scientific, conscientious men, that the very name of dentist is with many a name, if not of dishonor, at least of discredit. By

many, in fact, the science of dentistry would be described as "the knack of pulling out and putting in teeth," and a man who has acquired a little skill in these operations, and, by dint of lead and brass, can bungle through certain others, passes current as a master of the art. I am inclined to think this is peculiarly so in France. The number of self-celebrated dentists there, is enormous—composing a perfect legion of *Dis*Honor. You see their flaming advertisements, bristling with the teeth of their victims—like Indian wigwams hung with the scalps of the enemy—everywhere.

On the broad, beautiful Boulevards, in all the splendid arcades and spacious squares, are displayed showy frames, exhibiting full sets of artificial teeth, opening and shutting as teeth never opened and shut before, from morning to night; and grinning at the green and gullible public with a pertinacity and impudence only too characteristic of their inventors.

Dentists' saloons, showy as shaving saloons, (and in some respets not unlike them,) are rigged on wheels and dragged through the streets by gaily caparisoned horses, while the spirited proprietor sits in state by the side of the driver, and, as the vehicle stops from time to time, harangues the multitude very much after the fashion of our equally enterprising, but I trust more scrupulous, Connecticut pedlers. The harangue finished, the "wooden nutmegs"—I beg pardon—the patent teeth duly exhibited, and the public, without distinction, being invited to walk in, one of the hired *attaches* of the establishment, with his excruciating face half concealed by a dirty handkerchief, enters the saloon, and in a moment after returns, grinning like a clown, and informing the bystanders that whereas five minutes ago he had the horridest toothache in the world, he is now entirely cured and is the happiest man alive. Then one of his colleagues enters, and after a few moments of awful silence, makes his exit, swearing that meanwhile his impudent jaws have been circled with thirty-two as fine teeth as ever cracked a nut. These decoy ducks having "acted well their part," the success of the trick is seen by the fact that crowds of real sufferers now enter the gilded cage, (perhaps I should say the lion's mouth,) whence, it is needless to add, they are glad to emerge on any terms.

There are other tricks of the trade, too well known to every one who has visited France, and almost too ridiculous to mention. The latest appears in the form of a book, calling upon every man to pull and plug his own teeth, as if every man who attempted such a thing were not sure to have a fool for dentist.—*Dent. News Letter.*

QUARTERLY SUMMARY.

1.—*Treatment of Teeth which have already, or have to be, deprived of their Internal Vitality.*—In the News Letter for January, 1854, Dr. J. F. B. Flagg says, that this is an operation requiring not only much individual experience, but all the information that can be obtained from the experience of others, in order to weigh properly all the circumstances of the case, and to decide correctly with regard to the course most proper to be pursued. The operation of filling the pulp cavity, and not of a tooth, has been performed occasionally for more than fifty years, and with various degrees of success, but this subject has not, until recently, attracted very general attention, and even now, objections to the operation, which must limit its performance, present themselves.

When a tooth is in a condition to require such operation, the patient, as a general thing, has made up his mind to its loss, and when he is led to believe that it may be saved, the whole responsibility of failure rests upon the dentist, unless the matter is so presented to his mind as to enable him to estimate duly the chances of success, and to decide the question himself. Even with those who have been most successful in the performance of this most difficult and tedious of all dental operations, failures do sometimes happen, apart from any oversight as it regards thoroughness in the performance of the operation, there are other circumstances which should be well looked into that must govern the dentist in operating, and in the subsequent treatment should inflammation and alveolar abscess supervene, before he resorts to the removal of the tooth.

The importance and usefulness of the tooth constitutes the first and great consideration, without any reference to the feelings of the patient with regard to the retention of the tooth, who, through fear of extraction, may desire it, as one who would be most likely to shrink from this, would most likely be the one, from peculiarity of temperament, in which he would be least apt to succeed. The general health of the patient and the condition of the tooth should

decide the judgment of the operator as to the propriety or impropriety of the operation.

The chances of success are greater in an incisor and cuspidatus than in a bicuspis, and in a bicuspis than a lower molar, and in the latter than in an upper molar, and in a tooth in which it becomes necessary to destroy the pulp than in one in which this is already dead. More thorough preparation and filling are necessary in such cases than in teeth recently deprived of their nerves.* Scrofulous patients, though more liable to abscess, do not usually experience as much pain as persons of a nervous or plethoric habit.

Five hours is long enough for the arsenious acid to remain in a tooth. This is long enough to paralyze the nerve, and in twenty-four hours it may be removed entire with a broach, and when the arsenic only remains this length of time, its deadly influence is not extended beyond what we desire it to act upon.

Dr. Flagg here relates a case in which he had occasion to prepare the roots of the six upper front teeth for artificial substitutes, and after having extirpated the nerves as high up as it was necessary to drill for the pivots, and as he was unable to complete the operation at that time, there being still a little remaining sensation in all the roots, he applied to each a small quantity of arsenious preparation, directing his patient to pick it out the next morning, and wash her mouth with cold water. This she neglected to do, and when he saw her at the expiration of ten days, the action of the arsenic had extended to the surrounding membranes, and destroyed their vitality, so that but a very slight force was necessary to remove the roots.

The future health of the patient should not be risked beyond the worth of a tooth under any circumstances. In forming a diagno-

* "About ten years ago, it was suggested by Dr. Flagg, of Boston, that *previous to filling* such teeth as these, an opening should be made into the nerve chamber by means of a small drill, passing it through the gum about an eighth of an inch below the neck of the tooth, by which a vent is secured, and this new opening protected by means of the gum acting as a valve, thus allowing the gas to escape, and effectually providing against obstructions from foreign substances taken into the mouth. I call attention to this method of treatment in this place for the following reasons:—Firstly, if the operation is carefully performed, it is very generally successful. Secondly, an injustice has been done to Dr. F. in attributing this operation to Dr. Fox and others, of ancient date, when it will readily be perceived that though the operation is the same, the application is very different—one is to cure the disease, the other is to anticipate and thus prevent the disease occurring."

sis, therefore, the idiosyncrasy, present state of the general health of the patient, and amount of suffering induced by the operation, should be properly considered. It would be bad practice to permit a tooth to remain in the mouth after it has extended a morbid action to the antrum maxillæ, or, if in the lower jaw, after suppuration had extended to the external tissues. An approximation to such effects should not be permitted.

2.—*Restoration of Hearing by the insertion of Artificial Teeth.*—Dr. Jas. S. Gilliams states in the Dental News Letter for January, 1854, that the principal function of the *Eustachian tube* appears to be the maintenance of the equilibrium between the air within the tympanum and the external air, thus preventing inordinate tension of the membrane, which would be likely to occur if the pressure were greater on one side than on the other, and the effect of which would be imperfection of audition.

Having laid down this general proposition, the doctor mentions the case of a lady who applied to him to repair a set of artificial teeth, requesting that they should be attended to as soon as possible, as she could not hear when they were out of her mouth. About a year after, his attention was again called to the subject by a lady who called on him for a set of artificial teeth, and at the time was so deaf that it was with great difficulty she could be made to hear. When the teeth were placed in her mouth, she at once exclaimed, accosting Dr. G., "I hear everything you say, I can hear you perfectly well." He has subsequently met with other similar cases where the hearing has been partially restored by the same means.

Dr. W. was led by these observations to inquire whether any change could be induced in the orifice of the Eustachian tube by the excessive approximation of the jaws, whereby the orifice might be closed, or be made to impede the transmission of air through it. Supposing that deafness arose from want of balance between the air within and without the tympanum, or that external deafness was occasioned by causes affecting this membrane, or from obstruction of the external meatus, while the sensibility of the nerve was preserved, the cause of deafness might be more easily understood.

3.—*Dentistry at Kaw Mendi, West Africa.*—Dr. J. Cutler Lefft, writing from the Mendi Mission, says, in Dental News Letter, Jan-

uary, 1854, "I only practice dentistry a little for my associates, and occasionally for the natives, yet I love my old profession, and am pleased to hear of the many improvements which have been made in it from year to year. I have been called, when on business at Freetown, the capital of Sierra Leone, to practice some for the English, German, and Portuguese, while settled there as merchants, consuls, ministers, &c., and a few cases for the wealthy native merchants. If there were a few more Europeans settled at Freetown, it would be a good location for a dental surgeon, but as it is, it would not give a living.

While at Sierra Leone, I have had opportunities to notice the teeth of twenty different tribes, from all parts of Africa. They all have better teeth than the whites, of America, and particularly those from the slave ships. Their change of habits when they come to the colony, many of them becoming servants and cooks in the families of Europeans, where they contract the habit of eating highly seasoned food, and drinking hot tea and coffee, soon show themselves upon their white teeth. Indeed, most of the natives for whom I have operated, are those who have been educated in England. It may be that great use of tobacco is a cause for their soon having bad teeth. Most of them, men and women, smoke very much. Some tribes have a curious custom of filing or cutting either upper or lower incisors, or both, almost to a point, like the South Sea Islanders. They say that they do it to cut "Yanga," i. e. to make them look more beautiful. I have never seen a people prize their teeth more highly than the Kroo tribe, of South Africa. There is no mark of esteem so great to a sweet-heart, as the gift of a tooth. In Sierra Leone, it is an incident of frequent occurrence to meet men of this tribe minus a couple of teeth, i. e. the central superior incisors. Surgeon St. Clair told me an incident which illustrates this point. One of their Kroomen came to him and requested him to extract two beautiful sound incisors. The doctor asked the reason, and was informed by the honest native, that he wanted to send them back to his own country to his sweet-heart.

I had much trouble during one year to keep my instruments in order, free from rust, but I finally avoided the trouble by packing in a common tin box. From my experience, I think surgeons would preserve their instruments by placing them in a tin box or case to shut closely with a trap, not packed with cloth or cotton, &c., but merely in a buckskin, and oiled with mercurial ointment.

4.—*Periostitis.*—Dr. D. B. Whipple states in the News Letter, for January, 1854, that in the treatment of acute periodontitis, all the remedial means which he has been able to employ, occasionally prove unsuccessful; as there seems to be an agent wanting within the pale of the dentist, which will enable him to meet the indications of treatment promptly. Admitting our aid is sought when a case presents in this stage, the object, doubtless, is to produce resolution, and, I believe, to produce this our most effectual means, is depression, and the leech is the agent.

We will suppose a case. A patient applies, for whom a year previous we have treated with great care, the exposed pulp of a central incisor; he now complains of great pain, and, upon examination, find the periosteum in the acute stage; from our diagnosis we direct leeches to be applied. Here the patient passes from our surveillance, and the inference seems to follow that the dentist does not possess all the remedial agents requisite to meet the demand in the treatment of the teeth and their diseases. There is not a dentist who does not wish to possess the power of giving relief, which, in these cases, he is obliged to seek from another. Such wishes have induced me to experiment, and, although my experience has been small, my success induces me to announce it. I think that an artificial substitute for the leech in the local abstraction of blood from the inflamed part about a tooth, can be employed as effectually, something upon the principles of the cupping glass. The dental leech introduced several years ago, is upon this principle, and with it I have treated several cases successfully. The inefficiency complained of by some is attributable to insufficient lancing. The incision must be deep, and my plan is to use the spring lancet, setting it to cut through the integument, and making in some instances a crucial incision. By thus severing the congested blood vessels, a large flow is established, and favoring the determination and relaxation by bathing the part with warm water, I am enabled to obtain as much as by the natural leech. There are other means of meeting such a case, the above is conceded to be the best. All the antiphlogistic remedies may be resorted to, and the counter irritants and discutients, also local depletion meets the case more decidedly. After the leech I direct the part to be bathed with

℞.—Sulph ether, . . ℥ ss
Gum camphor, . . ʒ ss

By the ether we have the anodyne influence and refrigerant also,

from its volatile properties, and a tonic action is exerted upon the dilated and relaxed vessels. The camphor, for its discutient properties. (This combination may be used as a prophylactic remedy, when slight vascular excitement is evidenced.) The writer's purpose in this paper is chiefly to describe his mode of using the lancet in conjunction with the artificial leech in the acute stage of periostitis, and the adjunctive treatment he refers to merely from its incidental connection.

5.—*Extraordinary case of Periosteal Irritation during the Eruption of the Dentes Sapientiæ.*—By J. D. White News Letter of January, 1854.—Dr. W. describes the case of a young lady, eighteen years of age, Miss L——, who complained of great pain in all the teeth of both jaws; they were sore to the touch, and very sensitive, particularly the canine teeth; she was unable to chew the softest substance, or brush or rub them with a cloth, and was unable to rinse them with a fluid above or below the temperature of the mouth. The lady was of a sympathetic temperament, great irritability of body, gums pale and rather spongy. The wisdom teeth were not yet erupted. Her medical advisers had been treating her for *neuralgia*, but with no success; they pronounced the roots of the teeth *diseased*, i. e. there were abscesses or fleshy substances growing on the ends, but as the nerves of the teeth were not dead, and all decayed teeth well filled, he knew there could be no alveolar abscess, and therefore pronounced it a case of *irritability of the periosteal membranes, consequent upon the development of the wisdom teeth*, which would pass off when the teeth were erupted. Her physicians did not agree with him, and they consulted another dentist of high standing, who said it was only a case of irritability of the teeth and gums, without any connection with the wisdom teeth, and advised an astringent wash, which, however, afforded no relief. Dr. W. then cut away the gum over the wisdom teeth of one side as an experiment, and the operation was attended with such success as to justify a like operation on the other side. The gums over some of the teeth united in a few months, when the unpleasant symptoms returned, proving conclusively that the first diagnosis was correct; the gums were cut away again over the wisdom teeth, but they closed as before, when they were once more cut and two of the teeth extracted. The gums healed, and all unpleasant symptoms passed off. The first

and second inferior and superior molars were still in the mouth on the side from which the two wisdom teeth were removed, which accounted for the fact that the wisdom teeth could not well free themselves from the jaw and gum, whilst on the opposite side the first inferior and first superior molars had been extracted early in life, and the wisdom teeth on this side occupied about the same place as the second molars of the opposite. The jaw was too short to allow of the free eruption of the wisdom teeth without extracting an anterior tooth. This case illustrates many similar, although not so strongly marked.

CHEMISTRY.

6.—*Alcohol and its Effects on the System.*—Dr. Ducheck has published recently, in the Prager Vierteljahresschrift, a paper on the "Behavior of Alcohol in the Animal Organism," which has been translated for the Philadelphia Medical Examiner. We give a brief abstract of this important article.

There are six varieties of alcohol known: the ethyl, methyl, amyl, acryl, cetyl and glyceryl alcohols. Each of these has an aldehyde which differs from the alcohol by possessing two atoms fewer of hydrogen, and an acid which may be written chemically by adding two atoms of oxygen to the aldehyde.

Alcohol changes into aldehyde by absorbing two equivalents of oxygen, which form two equivalents of water and one of aldehyde. The aldehyde absorbs two more equivalents of oxygen, which in like manner form one atom of water and one of acetic acid. The acetic acid is similarly oxydated into water and formic acid, which changes by the same agency into water and oxalic acid, and this last is ultimately resolved into water and carbonic acid, the last products of the oxydation of alcohol. These metamorphoses will be better understood by the following formulæ.

Alcohol, $C_4\ H_6\ O_2 + O_2 = 2\,H\,O + C_4\ H_4\ O_2$ aldehyde.

Aldehyde. $C_4\ H_4\ O_2 + O_2 = H\,O + C_4\ H_3\ O_3$ acetic acid.

Acetic acid, $C_4\ H^3\ O_3 + O_4 = H\,O + 2\,C_2\ H\ O_3$ formic acid.

Formic acid, $C_2\ H\ O_3 + O = H\,O + C_2\ O_3$ oxalic acid.

Oxalic acid, $C_2\ O_3 + O = 2\,C\,O_2$ carbonic acid.

The author, by means of a stomach pump, introduced into the stomachs of three dogs, large quantities of absolute alcohol, and into the rectum of a fourth dog a drachm and a half of fusel oil.

In all four cases, intoxication and death took place. The phenomena were the same, whether the alcohol had been introduced through the stomach or the rectum. The blood was darker, had an alkaline reaction and an aldehyde odor. In two cases aldehyde was detected in the blood, but no further products of the oxydation of alcohol. Alcohol was never found in the blood, and in the stomach only in very small quantities, even when it had been quite recently injected. The urine and the fluid in the ventricles had an odor of ether. No anatomical changes were observed.

It appears, therefore, that alcohol does not exist, even for a short time, as such in the blood. The odor of the breath, which has been relied on by some to establish the circulation of alcohol, is due rather to that alcohol which remains in the cavities of the mouth and throat. Besides this, the bouquet of the liquid, the œnauthic or other ethers which give the peculiar odor to those beverages, communicate their odor to the breath and this is often confounded with the smell of alcohol. The alcoholic smell of the blood, noticed by some anatomists who have made autopsies of drunkards, is really an aldehyde smell, which has been mistaken for the former.

Now where does this oxydation of alcohol to aldehyde take place? Not in the stomach, because it cannot be detected there and because the same results are obtained by injecting the rectum where there is no oxygen to produce the metamorphosis. Not in a remote part of the body as the lungs, for it cannot get there, since alcohol immediately coagulates the blood when it comes in contact with it. The change must therefore take place in the animate vessels, immediately after absorption takes place; or, in other words, the alcohol passes through the mucous membrane, and is immediately converted into aldehyde.

Aldehyde must, therefore, be the intoxicating agent. Experiments upon this matter gave the following results. 1. Aldehyde, introduced into the venous blood or the stomach, produces the same violent symptoms of intoxication as alcohol taken in the ordinary manner. 2. A large quantity of aldehyde suddenly introduced into blood, coagulates it. 3. After the narcotic influence was over, acetic and oxalic acid were found in the blood. These results of the oxydation of aldehyde are never found in the blood of animals dying during the intoxication. Hence it follows not only that aldehyde is the intoxicating agent but that it is eliminated from the system by a process of oxydation. 4. If there is great ex-

cess of aldehyde in the system, at a time, it may escape from the lungs with the ordinary exhalations. Hence, in part, the odor of the breath, confounded with the smell of alcohol.

The alternate oxydation, as we have already seen, must be into carbonic acid and water. To determine these excretions, experiments were made upon dogs, taking into account the amount of expired air, the number of respirations and of arterial pulsations and the animal heat. The results were: 1. After taking alcohol, more air is inhaled, showing an increased need of oxygen. 2. In the expired air is found less water and less carbonic acid. 3. The respirations and arterial pulsations, together with the animal heat and consequently the process of oxydation, were greatly augmented.

The blood is deprived of a great amount of oxygen which would otherwise go to the combustion of other substances. The chief constituent of the blood which suffers in this way is the grape sugar, because aldehyde having a greater affinity for oxygen than sugar, the latter remains unconsumed for a time. Now, the proportion of carbonic acid to water produced by the combustion of alcohol is as $1 : 1\frac{1}{2}$, whereas in grape sugar it is as $1 : 1$. This accounts for the diminished exhalation of carbonic acid during intoxication. The diminution of the water, is due to the stimulation of the kidneys by the alcoholic liquors injected. The water is diverted to them. Diabetes also takes place, in consequence of the retarded combustion of the sugar.

The further metamorphosis is important. If it is not eliminated as water and carbonic acid, it must be converted into fat. Hence the bloating of drunkards.

The effect upon the nitrogenous constituents of the blood is unknown. Death, when it takes place, is the result of an excess of aldehyde which does not find oxygen enough in the blood to oxydate it to products suitable for elimination.

Experiments upon the chronic effects of alcohol showed that emaciation and tremors of the hind legs were the principal results. In one instance, however, the dog became very fat.

After sudden death from alcohol, no anatomical change was found, except a slight œdema of the lungs. In old drunkards, emaciation was observed, but no change in the brain, not even the thickening of the membrane described by Huss. Contrary to all the statements of anatomists, no change was found in the stomach.

The number of autopsies made is not recorded, and we cannot accept this as a pathological law.

The author abridges his results as follows:

1. Alcohol undergoes, in the system, continual combustion, of which the intermediate products are found in the blood.

2. Intoxication is dependent upon the existence of aldehyde in the blood.

3. The action of aldehyde upon the blood is the rapid withdrawal of its oxygen.

4. Therefore, the combustion of other substances in the blood, and consequently their metamorphoses are prevented or retarded.

7.—*Grape Sugar.*—In Robin and Verdeil's Anatomical Chemistry, there is an excellent *resumé* of our knowledge upon this subject. There are some new facts introduced there in addition to those already in our previous Quarterly Summary.

They sum up the origin of glucose under three heads:

1. The various principles of the body may themselves yield sugar. Animals fed on nothing but meat and bones, had sugar in their liver.

2. Cane sugar disappears, and is transformed into glucose in the liver.

3. When taken as food, it enters the liver directly, and then only can it be found in the portal vein. The cooked amylaceous substances taken as food also are converted into dextrine which is formed into sugar by the liver, and into glucose.

They consider diabetes to be owing to various affections of the lungs, or, perhaps, also to some disease of the medulla oblongata.

Dr. Harley has recently performed some experiments on this subject, which he has reported to the Societé de Biologie, at Paris. They seem to show that the reflex nervous action which results in the formation of sugar, originates in the liver itself, and is occasioned by the stimulating power of the blood of the portal vein on the hepatic branches of the pneumo-gastric nerves. When various stimulating substances were injected into the portal vein, sugar was voided in the urine, and the diabetes persisted for several days. When it is remembered that diabetes often follows the use of alcohol, the importance of this fact will be appreciated, though, as we have already shown, the direct action of aldehyde in the blood.

diminishing the regular oxydation of that fluid, is probably the chief cause of this change.

9.—*Use of the Pancreatic Fluid.*—Professor Herbert tied the pancreatic duct in order to determine whether Bernard's opinion in reference to the use of the pancreas was correct. He found that the fatty matters were still emulsified, notwithstanding the non-admission of the pancreatic juice. He also states, contrary to the declaration of the French observers, that the milky hue of the contents of the lacteals is observed above the duct. It will be seen that these results are diametrically opposed to those of Bernard and the committee of the French Academy.

9.—*Rhythmical Movements of the Heart.*—Dr. Brown Sequard attributes the action of the heart to the stimulus of the *carbonic acid* contained in the blood. He bases his opinion upon three principal facts: 1. If warm-blooded animals are prevented from breathing, the beatings of the heart become more frequent for one or two minutes. 2. The hæmadynomometer shows an increase of the circulating energy during asphyxia. 3. All the causes which increase the quantity of carbonic acid in the blood increase the frequency of the pulse.

EDITORIAL DEPARTMENT.

BIBLIOGRAPHICAL NOTICES.

Homœopathy, its Tenets and Tendencies, Theoretical, Theological and Therapeutical. By JAMES Y. SIMPSON, M. D., F. R S. E., Professor of Midwifery in the University of Edinburg, &c. &c. First American from the third Edinburg edition. Philadelphia. Lindsay & Blakiston, 1854.

THERE are certain falsehoods so glaring and so monstrous that it requires an enormous amount of self-control to treat them with any thing like gravity or sobriety. If homœopathy does not belong to this category, we must confess we do not know how to classify it.

When a man comes before the world with the grave announcement that a certain drug, in the proportion of about the quadrillionth or the decillionth of a grain will produce paralysis, sleeplessness, humming in the ears, embarassed speech, shocks at the pit of the stomach, palpitation of the heart, and a great variety of similar severe symptoms, and claims this as the result of numerous and carefully repeated experiments, we naturally suppose that he is speaking of some terribly energetic poison, far exceeding in its destructive powers any deadly agent of which we have any knowledge. Aconitina, the effective principle of monkshood, produces its unpleasant effects in the dose of the seventy-fifth to the fiftieth of a grain, and that is the most energetic of the poisons yet introduced into the materia medica. But these are gigantic doses compared to the largest of this frightful agent. They bear the same proportion to it that twenty-five thousand millions of millions of tons do to them. What unheard of agent can this be? asks the alarmed reader, trembling lest an impalpable grain of it floating through the air might reach and annihilate him. What can he think then of the sanity of the discoverer, when told that the tremendous potency is no more than *common salt*, of which "a single tear drop contains millions of times more than would suffice for the treatment of all the individuals of the human family who have ever had an existence?" We frankly confess such assertions as these to be altogether too much for our gravity.

Dr. Simpson, however, has put a strong control upon his feelings, and has gone into the examination of this monster delusion with a gravity and industry beyond all praise. Dreading lest he might be accused of exaggeration and misrepresentation, he quotes the writings of renowned homœopathists, from Hahnemann down to the present day. Such monstrous

and incredible statements, we confess, we were not prepared for, although perfectly aware of the general absurdity of homœopathic doctrines.

The doctor first considers the relations of homœopathists to physicians, and vindicates the course of the British universities and associations in refusing to recognize these pernicious quacks. He then goes into a consideration of infinitesimal doses, psorism, dynamization, olfaction, &c. The absurd experience argument is then taken up, its fallacy shown, and its applicability to all forms of quackery exposed. Last of all the doctrine of *similia similibus* is taken up.

The book is a little diffuse, but it rips up the follies of homœopathy, and discloses various rascally maneuvers on the part of its practitioners. Altogether it is the most complete *exposé* of this species of charlatanism we have yet read, and we commend it not only to the profession, but the public generally.

Homœopathy fairly Represented; a Reply to Professor Simpson's "Homœopathy" misrepresented. By William Henderson, M. D., Professor of General Pathology in the University of Edinburgh. First American, from the last Edinburgh edition. Philadelphia. Lindsay & Blakiston.

It was certainly a great misnomer in Professor Henderson to call this a *reply* to the book last noticed. He studiously avoids Professor Simpson's strong points and makes up for his deficiency in logic by copious personality. His style is theatrical, and manifestly aimed at the general public. There is a spite and venom about the book very appropriate in a man, who, feeling himself worsted in argument and unable to reply, vents his anger in impotent and unmeaning abuse.

He does not pretend to deny Doctor Simpson's statements, but writes a biography of Hahnemann with a running commentary on his doctrines and an occasional allusion to the doctor's book. He dwells largely on the numerical method of observation and the results obtained at Fleischmann's hospital at Vienna, but takes good care to avoid Dr. Simpson's arguments to show the fallacies of these deductions.

The numerical method, after all and at the best, can only afford approximative results. It is impossible to gain any satisfactory knowledge of pathology or therapeutics from it. Of what avail is it to us to know that in 10 out of 12 cases of a disease there were certain anatomical changes, unless we know the symptoms which accompanied them. So too in regard to therapeutics; it is idle to talk about averages of treatment. We must know the adaptation of means to ends, or we know nothing.

Take this very pneumonia about which Dr. Henderson makes such an ado. What avail the tables of Grisolle, or Lewis, or Dietl, or Fleischmann? What physician, who has ever stood at the bedside of a patient

afflicted with pneumonia can be persuaded of the inutility of the lancet. You might as well try to persuade him that light was unnecessary to vision. The fault of all these tables is that they do not take into account the condition of the patient. One can very easily understand that the lancet may be inefficacious in fully formed pneumonia, but jugulate immediately the same disease while just setting in.

Dr. H. makes some allusion to animal chemistry. This is too absurd. Homœopathy stands about as much chance before physiological chemistry as the paper on which its doctrines are written does in the jet of an oxyhydrogen blowpipe.

The Georgia Blister and Critic, for March, 1854. Edited by H. A. Ramsay, M. D.

The journal with this ominous title hails from Atlanta, Georgia, and is, we are told, devoted to the development of southern medical literature and the exposition of the diseases and physical peculiarities of the negro race.

The American Medical Monthly. Published by G. P. Putnam, N. York.

We have received three numbers of this journal, which is a new claimant for the patronage of the medical profession. It is well conducted. Its original department is excellent and its selections judicious. We wish it success.

DENTAL EDUCATION.

So many different views are entertained in regard to the education proper for a dentist, that it would seem a superfluous task on our part to add another to the thousand and one speculations already before the world. Still, as we have become in a measure identified with the question, silence, at this time, might be construed into a hesitancy about expressing our opinions, which we are far from feeling.

The primary question to be decided by any one really in earnest about a professional education, is simply this: What is the position I design to occupy? This being answered, the rest is soon settled. Now, what is the position which the better class of dentists have been for many years aiming at? What is their ambition? Why, the very laudable one of having their art recognized as a specialty of medicine. They claim an equality with aurists, oculists, othopœdists, and specialists generally, who have succeeded in getting themselves recognized by the medical profession.

Now, no one that we have ever heard of, pretends to rank any exclusive specialty in any science as equal to the whole science itself. The technological chemist, though he may have exhausted all existing knowledge in his department, is rated by no one, whose opinion is worth having, on a par with the chemical philosopher, whose studies and acquirements embrace the whole round of the science, and comprise the results of myriads of observations in all the specialties.

There is, however, a rank among specialists themselves, and to keep clear of any suspicion of personality, we continue our illustration from the chemical profession. Take two technological chemists, one of whom is a routinist, and the other an observer. The routinist is drilled thoroughly in all the deduced principles of his department. He understands all the manufacturing processes, and conducts his work with precision and accuracy. He may suggest improvements in the arrangement of the parts of a factory, or detect errors in the construction of the flues. He is a reliable man, and enjoys the full confidence of the master-manufacturer who employs him, and the respect of those who are under him.

The other is as well drilled as his brother chemist in all the technological deductions of chemistry, but he has gone farther. He has extended his studies into the domain of chemical philosophy. He understands the principles which underlie the formulæ, and can criticise not only the operations, but the rules which guide them. He is, therefore, prepared to take advantage of his position, and to gain that knowledge of the influence of quantity upon chemical changes, which the analyst and the laboratory chemist can never acquire. He reasons upon what he sees, detects fallacies that escape the scrutiny of the routinist, and adds to the common stock, not only of technological, but of philosophical chemistry.

Now, that these two men hold very different relations to the higher class of chemical philosophers, no one can fail to perceive. Both are specialists; but one is a specialist, and nothing else; the other touches upon the domain of philosophy, and obtains a recognition which is not accorded to his brother chemist.

Apply these remarks, these facts, to the position of the dentist. How can the medical profession, with its learning, its skill, its high position, its centuries of renown, its memories, its muster-roll of great names, its army of great intellects, before whom all men must bow in respect, how can such a profession recognize a mere mechanical pursuit as a department of its own great art?

Now, it is of no avail to attempt to reply to this by citing the ignorance of many members of this exalted profession. Plenty of asses, calling themselves doctors, there undoubtedly are, but for all that, *medicine* is not asinine. The medical schools have generally been untrue to their trust, and have overwhelmed the profession with fools, for the meanest of all mercenary considerations. The best defence that they can make is, that their

graduates are somewhat better than the horse-doctors, and the Indian-doctors, and the old women, and the Thompsonians, whom they supersede; and their honest confession that, were they to reject every man who could not spell the words of his mother-tongue correctly, to say nothing of speaking or writing tolerable English, they would be compelled to close their doors, is a melancholy admission of their inability to elevate the standard of the profession, or even to keep it up to what it was before they commenced tinkering at it. But these boobies that feel pulses, and look at tongues, and give pills all over the land, are not the medical profession. The very professors who give them their diplomas would scorn to meet them on terms of professional equality. *Their* recognition or non-recognition of anybody or anything, amounts to nothing at all. For all this paralysis in the extremities, however, the heart and brain of the medical profession are still sound. There are still profound learning, great acumen, high intellectual powers, boundless acquirements in its members, in spite of the low standard of requirements acknowledged by the colleges; so that the plea alluded to is worthless, and he who claims affiliation with this profession, comes before a tribunal fully competent to decide upon his merits, with an authority that all the world must submit to.

It is manifest, therefore, that before a specialty can pretend to a recognition from so learned a body, it must itself be learned. It must have sufficient knowledge of general science to be able to determine when its own facts can add to the common stock, and what the value of those facts is. It must, in short, have some general idea of that art to which it claims to belong. Without this, it must forever remain neglected and obscure, obtaining no respect because deserving none.

If, then, a dentist wishes only to be a mechanic, exercising his ingenuity upon the teeth, let him have a mechanic's education, and take a mechanic's rank in the scientific world. If he desires to be acknowledged as a collaborator with the physician, let him get such a knowledge of general science and literature as will qualify him for such associations. It is the height of folly for any man to struggle into a society in which he cannot maintain himself. He only pays a premium for ridicule, and offers a bribe for contempt.

New York Dental Recorder.—Dr. C. C. Allen, formerly and for many years the sole editor of the Dental Recorder, and during the last year the senior editor, has wholly withdrawn from the publication, confiding its future management to Dr. A. Hill, of Norwalk, Ct., who had previously for a short time, been associated with him as junior editor. We are sorry to lose so good a writer and so courteous and gentlemanly a man from our little corps editorial as Dr. A., but we at the same time cannot but

congratulate him on being relieved from the cares and vexations necessarily connected with the management of a publication of this sort. Having experienced them ourselves, we know what they are. But while the readers of the Recorder, with us, regret the loss of the former able senior editor they must at the same time be gratified that it is still under the management and control of a gentleman every way qualified to conduct the publication. Dr. Hill, the present editor, has been known to the dental profession for several years as a ready writer and as a man of science. We extend to him, therefore, most cordially, the right hand of fellowship, and welcome him to all the pleasures, duties and responsibilities of full editorship, wishing him abundant encouragement and success in his arduous, and to some extent, new undertaking.

A good Patron to the Dentist.—A paragraph has been going the rounds in the papers, stating that the heirs of a Parisian dentist had recently brought suit for the recovery of about four thousand dollars, for twelve sets of artificial teeth furnished from 1841 to 1852, to a countess, famous, at the restoration, for her wit and beauty. Fifteen or twenty *paying* patrons of this sort would constitute quite a desirable acquisition to the practice of most dentists, but we would be decidedly opposed to so long a running account.

Short Comings.—Most of the editorial notices intended for this number of the Journal have been crowded out by the press of other matter. The same circumstance has shortened very materially our Quarterly Summary. The missing paragraphs will, however, be found in our next number.

OBITUARY —Died in Ossipee, N. H., in January, 1854, Mr. ALBERT G. BREWSTER, Surgeon Dentist, Æ. 30. Mr. Brewster departed this life in the mansion of his late father, John Brewster, Esq. He had been in the dental profession about seven years, and located during much of that time in the city of Salem, Mass. He was a descendant of William Brewster the elder, one of the Plymouth Rock Pilgrims, by the branch of Wrestling Brewster, the elder's third son, and of the seventh generation of descendants.

THE

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ORIGINAL COMMUNICATIONS.

ARTICLE I.

Chemistry of the Metals—Mercury. By Professor REGINALD N. WRIGHT, A. M., M. D.

(Continued from page 346.)

WE present to our readers, a metal which has been known from remote antiquity. It is found both *native* and *mineralized;* in the former condition, however, (native mercury,) it occurs in but in few localities, and in comparatively minute quantities.* The principal ore of mercury, is that known commonly as *cinnabar*, a sulphuret of the metal, some very beautiful specimens of which have recently been found in California.

The lustre of mercury is eminently metallic, resembling polished silver, and this circumstance, added to the fact, that at ordinary temperatures it is fluid, has given origin to the

*It may not be amiss to remark, that in almost every mercury mine, occasional globules of the metal are found in a condition of almost absolute purity.

name, *hydrarguron*,* which literally translated from the Greek, means *silver-water.*

"The principal mines from which it is obtained are those of Idria in Carniola, and Almaden in Spain, where it is found both in the native state and combined with sulphur, as cinnabar, the latter being most abundant."—(Turner.) Considerable quantities have recently been found in California.

In procuring the metal from the sulphuret for ordinary purposes, we have but to apply heat, and add some substance which will retain the sulphur; we can use for this purpose either *iron* in minute division (as iron filings) or lime; the sulphur remaining in combination, while the mercury is volatilized and carefully condensed.

In Aikin's Chemical Dictionary, the processes of *Idria* and *Almaden*, are thus described: "At the mines of Deux Ponts and Idria, the ore being brought out of the mine, is sorted by hand with considerable accuracy, rejecting those parts which appear to be destitute of the metal. This is an expensive process, but has superseded the ancient method of separating the cinnabar by washing, on account of the prodigious loss of the metal by that operation. The sorted ore, being reduced to powder, is carefully mingled with 1-5th (more or less according to the proportion of cinnabar contained in the ore) of quicklime, which has fallen to powder by exposure to the air. This mixture is then put into iron retorts, capable of holding about sixty pounds weight, which, when thus charged, are fixed in a long furnace to the number of forty or fifty; a glass receiver being then attached to each retort, (but not luted,) a gentle fire is applied in order to drive out all the moisture; when this is effected, the juncture of the vessels is closely stopped with tempered clay, and a full read heat is applied for seven or eight hours, at the expiration of which time all the mercury will have been volatilized and condensed in the receivers. The common product varies from between six and ten ounces of metal, from one hundred pounds of ore."

* Hydrargyrum, is the term most commonly used.

"The method practiced at Almaden in Spain, differs considerably from the preceding, and is much more rude and inartificial. The pieces of pure cinnabar being first picked out from the ore, in order to be disposed of to the painters and manufacturers of sealing-wax, the rest is sorted into three parts. The first is the richest, and is in pieces of a moderate size; the second is in smaller pieces, and less abounding in metal; the third is the dust, and smallest fragments of the other two, which are kneaded up with clay, and formed into bricks, which are carefully dried in the sun. The furnace used for extraction of the mercury is an oblong mass of masonry, divided horizontally into an upper and lower compartment by an iron grate, and communicating near the top with a set of aludels. The charging of the furnaces commences by laying on the grate a stratum of flat rough stones, leaving intervals between each for the passage of the fire; upon this is laid a bed of ore of the second quality, then the ore of the first quality, afterwards another bed of the second kind, and at the top of all a layer of the third kind, made up into bricks. A few faggots are now thrown into the lower cavity of the furnace and lighted, which, in proportion as they are consumed, are succeeded by others, and thus a gentle fire is kept up for eight or twelve hours, according to the previous dryness of the ore. When the moisture is got rid of, (which is known by the cessation of the vapor,) the fire-place is again filled with the faggots, and, before these are consumed, the mass of ore will be sufficiently heated to continue the combustion, by means of the sulphur that it contains, without any additional fuel. During the next two days, (as the sulphur burns away,) the mercury, in the state of vapor, passes into the aludels, where it is condensed, and, at the end of this period, all the metal being extracted, the scoriæ are taken out of the furnace, and the aludels are emptied of their contents. Besides the mercury, a considerable quantity of a black matter like soot is found in the aludels, which is readily separated by spreading the whole about on an inclined table; the mercury runs to the lower end, where it is collected in a channel, while the impurities remain behind."

"The consumption of fuel, and cost of apparatus, is considerably less than in the German method, but it is probable that a portion of mercury still remains in the ore. A great loss is also sustained by throwing away the soot, after separating the running mercury on the tables, for not only many globules of mercury must escape notice, but also the calomel, cinnabar, &c. which it contains, are entirely wasted. This soot, previously to the separation of the mercury, consists, according to Proust, of

Mercury,	66
Calomel,	18
Cinnabar,	1
Water and sulphurous acid,	2 5
Sulphate of ammonia,	3 5
Lamp black,	5
Selenite,	1
	97 0
Loss,	3
	100 0

That mercury was well known to the ancients, is shown upon reliable testimony. We find in an English periodical, the following: "Pliny says, (xxxiii, 7,) that Callias, an Athenian, discovered the preparation of vermilion or cinnabar, B. C., 505. He also mentions the mines of Almaden, as producing in his time 10,000 Roman pounds annually, but this was not the amount which the mines could have produced, for the supply was purposely limited. LePlay, a French geologist, who visited Almaden in 1833, describes the mines as being richer than at any former period, furnishing annually nearly 2,244,000 pounds of mercury. About 700 men are employed under ground, and 200 in the operations connected with the extraction of the metal from the ore at the surface."

The method adopted for packing the metal after its reduction was peculiar, and much more imperfect than that in use at the present day, (wrought iron bottles being now almost universally used, containing each about 90 pounds.) According to Aikin,

"a fresh sound sheepskin, with the hair taken off, is laid over a wooden bowl, and from 50 to 75 pounds of mercury are poured into it; the ends of the skin are then gathered up and tied together with great care, thus forming a sort of bag in which the metal is enclosed; this bag is enclosed in a second skin, and the second in a third; lastly, these bags are put into very tight barrels, capable of holding from two to four of them, and in this state are brought to market." The following table, from Dumas, shows the present annual yield of the principal mercury mines of the world,* for quintals.†

Almaden,	25,000	to	32,000
Idria,	6,000	"	10,000
Hungary, Transylvania,	700	"	700
Deux Ponts,	400	"	500
Palatinate,	180	"	200
Huancavelica,	3,000	"	3,000
Quintals,	35,280	"	46,400

The equivalent number of mercury is variously stated, but may be put down at 200; its specific gravity is 13.5, which is increased to 14, when the metal solidifies. At common temperature, it is liquid, evaporates at 670°, solidifies with contraction at 40°, at which temperature it is malleable. The alloys of mercury and other metals, commonly known as *amalgams*, will next be presented, and since Professor Brande has, with his usual ability and accuracy, prepared an excellent paragraph upon the subject, we will lay it before our readers without comment or modification.

"Mercury combines with most of the other metals, and forms a class of compounds, generally called *amalgams*. Many of these are definite and crystallizable compounds, and may be separated by gentle pressure from the mercury, in which such definite compound is suspended or dissolved. They are gene-

* Mercury has been found in California, not mentioned in Dumas' list, because of its recent discovery.

† A quintal is nearly 108 avoirdupois pounds.

rally brittle or soft. One part of potassium with 70 of mercury, produce a hard brittle compound. If mercury be added to the liquid alloy of *potassium* and *sodium*, an instant solidification ensues, and heat enough to inflame the latter metals is evolved. Iron and mercury may be combined by triturating together clean *iron filings* and *zinc-amalgam*, and adding a solution of pure chloride of iron; by rubbing and heating this mixture, the iron and mercury form a bright amalgam.—(Arthur, Aikin.) Under common circumstances, iron resists the action of mercury so perfectly, that the latter metal is usually kept in iron bottles; and mercurial triangles and barometer cisterns are made of the same metal. The use of an amalgam of *zinc* has already been adverted to for the excitation of electrical machines.* Eight parts of mercury and one of zinc form a white brittle compound; five of mercury and two of zinc, form a crystallizable amalgam. Amalgam of tin is easily formed by triturating the metals together, or fusing them by a gentle heat; its density exceeds the mean of its components; it is largely used for silvering looking-glasses. This beautiful process is performed as follows: A single and perfect sheet of tin-foil, of proper thickness, and somewhat larger than the plate of glass, is spread upon a perfectly plane table of slate or stone; mercury is then poured upon it, and rubbed upon its surface with a hare's foot, or a ball of flannel or cotton, so as to form a clean and bright amalgam; upon this, excess of mercury is poured, until the metal has a tendency to run off; the plate of glass, previously made quite clean, is then brought horizontally towards the table, and its edge so adjusted, as by gradually and steadily sliding it forward, to displace some of the excess of mercury, and float the plate, as it were, over the amalgam, the dross on its surface being pushed onwards by the edge of the glass, so that the mercury appears beneath it, with a perfectly uniform, clean and brilliant reflecting surface; a number of square weights, of 10 or 12 pounds each, are now placed side by side upon the plate, so as entirely to cover

* Refers to a former part of his work on chemistry.

it, and press it down upon the amalgamated surface of the tin; in this way the excess of mercury is partly squeezed out, and the amalgam is made to adhere firmly to the glass. The mercury as it runs off is received into a channel on the side of the table, (which is slightly inclined to facilitate the drainage,) and in about 48 hours the weights are taken off, and the plate is carefully lifted from the table and set nearly upright, by which the adhering mercury gradually drains off, and the solid crystalline amalgam remains, perfectly and uniformly adhering to the glass. *Cadmium* and mercury unite with great ease, and the *amalgam* crystallizes in octoïdra, when composed of 100 mercury + 28 cadmium, (an atom of each metal,) it fuses at 167°.—(Stromeyer.) The amalgams of *cobalt* and *nickel* have not been examined. Amalgam of *copper*, may be made as follows:—viz. a hot solution of *sulphate of copper*, add a little hydrochloric acid and a few sticks of *zinc*, and boil the mixture for about a minute, by this means the copper will be precipitated in the metallic state and in a finely-divided spongy form; take out the *zinc* from off the liquor, wash the copper with hot water, and pour upon it a little dilute *nitrate of mercury*, which will instantly cover every particle of copper with a coating of mercury; then add mercury to the amount of two or three times the weight of the copper and a slight trituration will combine them so far that the completion of the process may be effected by heating the mixture for a few minutes in a crucible. (Aikin's Dictionary, Art. Mercury.) *Lead* and mercury readily combine in all proportions; 3 parts of mercury and 2 of *lead*, form a crystallizable compound. *Antimony* amalgamates with difficulty, and forms a granular compound. *Bismuth* and mercury readily unite; 2 parts of mercury poured into 1 of melted *bismuth* form a compound which slowly solidifies and crystallizes. When mercury is combined with a little bismuth, *lead* may be added without greatly interfering with the fluidity of the compound. Dr. Thomson states that Brecher was the first who observed the remarkable fluidity of a mixture of 3 parts of mercury, 1 of *lead* and 1 of *bismuth*, and that it may be squeezed through leather without decomposition; it is

used for silvering the inside of glass balls, which are previously made perfectly clean and warm. When mercury is adulterated, it is with these metals, but the facility with which it then oxydizes and the imperfect fluidity of its small globules, renders the fraud easy of detection. The action of mercury on the other metals which have been described has not been examined, with the exception of that or *tellurium* and *arsenic.* With *tellurium* it forms a granular compound, with arsenic a gray amalgam of 5 parts of mercury and 1 of *arsenic;* the metals required to be stirred together for some hours over the fire. Dumas suggests the examination of the action of *arsenimelted hydrogen*, on the chlorides of mercury."

"*Amalgam of Ammonium, Metallization of Ammonia.*—It was first observed by Berzelius and Pontin, that when mercury is negatively electrized in a solution of ammonia, or of an ammoniacal salt, or when an amalgam of *potassium* and *mercury* is placed upon *moistened sal ammonia*, the metal increases in volume, and becomes of the consistency of butter, an appearance, which has sometimes been called the *metallization of ammonia.* If mercury, which has been amalgamated with about the fiftieth part of *potassium*, be made the *negative electrode* in a solution of *sal ammoniæ*, the effect is produced to its greatest extent; the mercury puffs up to 80 or 100 times its original bulk, and if, in this state, it be cooled to 32°, it crystallizes in cubes, the amalgam is lighter than water, but when left to itself, it gradually shrinks back again into mercury, evolving *ammonia* and hydrogen, not exceeding in weight, a *seventy-thousandth* of that of the amalgam, and yet conferring upon it the semifluid or solid state, and susceptibility of crystallization; according to Gay Lussare and Thenard, the volume of the *hydrogen* is 347, and of the *ammonia* 422, to 100 volume of mercury. These extraordinary phenomena, have suggested several hypothesis concerning the nature of ammonia and its components, and also of the metals, respecting which, the reader may consult Gay Lussare and Thenard, (Recherches Physico-Chimique, vol. i,) who, finding the amalgam resolvable into *mercury*, *ammonia* and *hydrogen*, regard it merely as a compound of

these substances; and Berzelius (Lehrbuch, 1,) who considers the appearances as resulting from the combination of a metal, which he terms *ammonium*, with the *mercury;* this view of the subject gave rise to what has been called the *ammonium theory.*"

Compounds of Mercury with Oxygen.—Mercury combines with oxygen so as to form two oxyds known as *protoxyd and peroxyd.*

Protoxyd of Mercury.—Whenever one of the proto-compounds of mercury in solution, is acted upon by an alkaline solution, or when such a compound is rubbed with an alkaline solution, decomposition ensues, attended with the formation of the oxyd referred to. Under ordinary circumstances, when mercury is simply exposed to the action of the air, it undergoes no change.

Aikin has in his Dictionary the following: "Mercury is scarcely, if at all, changed by mere exposure to the air for any length of time, but if it be long agitated in any vessel it is slowly reduced to a black dust, soiling the fingers, which, however, on being heated returns again to the state of flowing mercury. Bœrhave was the first who performed this experiment, by fastening a bottle half full of mercury to a mill wheel, and thus giving it a very long continued and violent motion. The same has been done by fastening it to the wheel of a carriage during a long journey. Dr. Priestly found this black powder to be formed in a variety of circumstances by a long agitation of mercury in vials with water," &c.*

When we prepare the protoxyd by means of *protochloride of mercury* and *potassa* in solution, we must thoroughly wash the residuum, with cold water, after which it must be very carefully dried, and be kept during the latter process as much out of the light as possible, because, if incautiously exposed to the action of light, (especially the direct rays of the sun,) or even great heat, decomposition will happen, and metallic mercury will be deposited, and the peroxyd formed.

Speaking of the protoxyd of mercury, Brande has the follow-

* When formed in this manner, it has been called "ethiops per se."

ing: "A preparation often considered as nearly corresponding with this oxyd, is directed in the *London Pharmacopœa,* under the name of *hydrargini oxydum cinereum.* It is made by boiling calomel with lime-water; but it is not a pure protoxyd of mercury, and being uncertain in composition, is unfit for medical use. It is also supposed that the protoxyd of mercury is contained in the *pilula hydrargyri, or blue pill,* and in the *unguentum hydrargyri, or mercurial ointment.* But these preparations are rather to be regarded as containing *finely divided* mercury, and it is apparently obtained in a similar state when mercury is triturated with honey, mucilage, and other viscid bodies, and also with chalk, as in the *hydrargyrum cum creta* of the pharmacy. Indeed, it is astonishing to what an extent mercury may be subdivided into extremely minute globules, so as to lose its metallic appearance, even under a powerful magnifier; this is the case when solutions of mercury are precipitated by protochloride of tin; the metal then appears in the form of a gray powder, and remains in that condition while humid."

Some doubt still exists as to whether this substance is a suboxyd, protoxyd, or merely mercury, in a finely divided state; the weight of authority, however, is in favor of the existence of a true protoxyd, whose salts will yield a black precipitate with alkalies, and which will form proto-salts with acids. It has a decidedly metallic taste, cannot be dissolved in water, and has a very dark color.

The protoxyd of mercury may be represented by $Hg+O$.

Peroxyd of Mercury.—This oxyd is a red crystalline mass, having a strongly metallic taste, and almost insoluble in water.

One method of obtaining it consists in exposing the nitrate to a sustained heat. "In this process, twenty-five parts of mercury are dissolved in thirty-five parts of nitric acid. Nitric oxyd is abundantly disengaged, and on evaporation to dryness, a pure nitrate of mercury remains, which is carefully heated so long as fumes of nitrous acid are evolved. The resulting oxyd is in the form of an orange-red crystalline powder, forming the

hydrargyri nitrico-oxydum of the pharmacopœa." (Brande, p. 931.)

There are several other methods of preparing this oxyd, but we will content ourselves with mentioning only the two following:

If mercury is heated to 600° and upwards, with free access of air, it will be formed abundantly, and quite pure; should any liquid mercury remain, we may get rid of it by evaporation at a higher heat.

The other method consists in precipitation from a solution of corrosive sublimate, by means of an alkali, and afterwards using heat to drive off water.

In order to detect adulteration, which is sometimes practiced, we may expose the peroxyd to high heat; if pure, there will be no residuum, but if mixed with other substances, as red lead, the latter will not be evaporated, and the fraud can be readily made certain.

This oxyd is represented by $Hg+2O$.

"Both the oxyds of mercury combine with the greater number of the acids, forming two distinct classes of salts, several of which are resolvable into salts, with excess of base, and salts with excess of acid, so that the history of the saline combinations of mercury is thus rendered somewhat complex. There is also a great tendency to the formation of double salts among the caloric mercurial compounds; in short, mercury is, of all the metals, that which produces the most numerous and complicated series of saline combinations.

[To be concluded in the next number.]

ARTICLE II.

A Dissertation on the Diseases of the Dental Pulp and their Treatment, prepared for, and read before, THE ASSOCIATED ALUMNI OF AMERICAN DENTAL COLLEGES, at the BALTIMORE COLLEGE, March 18, 1854. By CHAPIN A. HARRIS, M. D., D. D. S.

[Continued from page 404.]

Inflammation.—The pulp of a tooth, when healthy, has a grayish-white appearance, and its capillaries are invisible to the naked eye, but when it becomes the seat of *acute* or *active* inflammation, they may be distinctly seen—the organ having assumed a bright red color. Inflammation having established itself, soon extends to every part of the pulp, and even to the alveolo-dental periosteum. When permitted to run its course uninterruptedly, it usually terminates in suppuration in from three to eight or ten days.

The unyielding nature of the walls of the cavity in which it is, on all sides, enclosed, renders expansion of the pulp impossible, and as its capillaries become distended with blood, they press on the nervous filaments which are every where distributed upon it, causing at first constant *gnawing*, but afterwards, as the distension of the vessels increases, severe, and sometimes almost insupportable, *deep-seated*, *throbbing* pain.

Inflammation may attack the pulps of sound teeth as well as those that are affected with caries, but it occurs more frequently in the latter than in the former, and it is oftener met with before than after the pulp has become actually exposed. The severity of it, however, is determined by the condition of the tooth, the state of the general health and the causes concerned in its production. The pulp when in an irritable condition is more liable to become the seat of acute inflammation that when in a perfectly healthy state, and the occurrence of

suppuration is soon followed by alveolar abscess, unless an opening is made immediately through the crown, neck or root of the tooth for the escape of the matter.

The effusion of lymph which takes place during the inflammatory stage, and which, under other circumstances, and when the inflammation is less severe, is made to play an important part in the reparation of the injury, compresses the pulp into still narrower limits as it accumulates in quantity, and thus, becomes an additional source of irritation, adding fuel to the flame already lighted up.

Inflammation of the pulp may be caused by a blow on the tooth; by impressions of heat and cold conveyed to it through the conducting medium either of the enamel and dentine, or a metallic filling, or by the pressure of a filling, or the direct contact of external irritating agents, as disorganized portions of the tooth, particles of alimentary substances, acrid humors, &c., But as I have stated in another place, *inflammation* of the dental pulp "is not always a necessary consequence of impressions" of heat and cold; "pain may be produced by them when it does not exist, but in this case, it usually subsides soon after the removal of the irritant. The pulp of a tooth may be exposed for months, and subjected several times a day to the actual contact of foreign bodies, without becoming the seat of acute inflammation. The irritation, and increased vascular action thus occasioned, are, no doubt, removed by the effusion of lymph to which they give rise, and the pulp, after it has become exposed, having room to expand as its vessels become distended, does not suffer irritation from the pressure to which it would otherwise be subjected.

When suppuration takes place, the pain very nearly ceases, but the tooth for a time remains sore to the touch, and its appearance is changed. It has no longer the peculiar animated translucency of a living tooth, but has assumed an opaque, muddy or brownish aspect. With the disorganization of the pulp the entire crown and inner walls of the root lose their vitality; still, if the alveolo-dental periosteum has not become seriously involved in the disease, the vascular and nervous sup-

ply furnished the exterior of the root, is often sufficient to prevent the tooth from exerting a manifestly obnoxious influence upon the surrounding and more highly vitalized parts. The cementum being more analogous in structure to true osseous tissue than dentine, now plays an important part in the animal economy. It being more liberally supplied with the nutritive juices and vitality, and not being sensibly affected by the death of the other parts of the organ, it keeps up the living relationships of the tooth with the alveolo-dental periosteum, at least sufficiently to prevent it from acting perceptibly as a morbid irritant.

Inflammation of the pulp of a tooth, besides the local pain with which it is attended, often gives rise to a train of constitutional morbid phenomena, usually of a mild, but sometimes of an aggravated and even threatening character. Among these are *head-ache*, *constipation of the bowels*, *furred tongue*, *dryness of the skin*, *quick*, *full* and *hard pulse*, *ear-ache*, *ophthalmia*, *disease of the maxillary sinus*, &c. The following cases, taken from many of a similar character, which have fallen under my immediate observation, will serve to convey some idea of the effects liable to result from this cause.

Mr. H——, a resident of Baltimore, of a sanguino-nervous temperament, about thirty-five years of age, had a left bicuspid of the upper jaw filled in May, 1850. The cavity in the tooth, as I afterwards ascertained from an examination, extended nearly to the lining membrane. The only immediate inconvenience experienced from the operation, as I was informed, was a slight momentary pain whenever hot or cold fluids were taken into the mouth. The tooth remained in this state for about two months, but at the expiration of this time, it began to ache. The pain, however, being slight, was attributed to a cold contracted a short time before, but in a few days it increased and soon became so severe as to be almost insupportable, depriving him of sleep at night. The pulp had now become the seat of active inflammation, which rapidly extended to the socket and gum, and in a short time to the alveoli of three or four of the neighboring teeth and to the maxillary sinus.

Congestion of the brain, with all its attendant phenomena, such as fever, full, hard and quick pulse, intolerance of light, and slight delirium supervened.

The most active treatment was promptly instituted and energetically pursued, consisting of copious blood-letting from the arm, saline purgatives in large doses, blisters to the back of the neck, leeches to the gums, and the extraction of the tooth which had given rise to the disturbance; but, notwithstanding, the local inflammation terminated in suppuration and necrosis of the sockets of five teeth and the floor of the maxillary sinus. The constitutional symptoms, in the meantime, disappeared, and at the expiration of about eight weeks, the dead bone had so far separated from the living that I was enabled, without difficulty, to remove it.

Now, the whole train of morbid phenomena in this case, originated in irritation produced by impressions of heat and cold, conveyed to the pulp through the medium of a filling in a tooth, and a thin layer of dentine. But in a person of less nervous excitability, these impressions would not have given rise to any permanent local disturbance, and they would not have been felt at all, if a non-conducting substance had been placed in the bottom of the cavity previously to the introduction of the filling. The prompt removal of the filling would have prevented the painful consequences that supervened, but when I first saw the patient, suppuration had commenced, and hence the removal of the tooth failed to afford relief.

In December, 1849, Mr. M., about thirty years of age, of sanguino-bilious temperament, sedentary habits, contracted a severe cold. The next day the left cuspid tooth in the upper jaw became the seat of intense throbbing pain. This, in common with all his other teeth, had sustained considerable loss of substance from mechanical abrasion, owing to the manner in which the teeth of the upper and lower jaws came together, but it had not suffered injury from any other cause. The inflammation which had seized upon the pulp soon extended to the alveolo-dental periosteum and gums. High fever, constipation of the bowels, and inflammation of the conjunctival

membrane of the eye of the affected side rapidly supervened. His sufferings, for several days, were intense.

The patient had been troubled occasionally, for several years previous to this attack, with dyspepsia, and at such times he experienced pain in several of his teeth whenever he took hot or cold fluids into his mouth, or inhaled cold air, but as it subsided immediately, it excited no apprehension, especially as the teeth in which these impressions were felt were free from caries. I saw the patient for the first time the evening of the third day after the attack. Suppuration of the pulp had now taken place; the tooth was slightly pushed from its socket, and the gum around it was swollen, indicating that alveolar abscess was in progress of formation.

The most active means had been used to arrest the inflammation and put a stop to the threatening constitutional symptoms, but as they were not resorted to until suppuration of the pulp was about taking place, they afforded but little relief. To give egress to the confined pus seemed now to constitute the first and most important curative indication, and for this purpose a hole was drilled through the worn end of the tooth to the pulp cavity. The escape of matter that followed the withdrawal of the instrument gave immediate relief. The inflammation of the surrounding parts, and of the eye, soon disappeared, and in a week the gum had assumed a perfectly healthy appearance.

In this case, nature, from some cause which cannot be easily explained, had failed to make that provision against the exposure of the pulp which she usually does under similar circumstances, consisting, as has already been intimated, in the gradual conversion of this organ, as the abrasion approaches the central cavity, into *osteodentine.*

The subject of the third case was a young lady of a sanguinous temperament, about nineteen years of age. In the summer of 1852, a small filling was put in the left approximal surface of a lateral incisor, after having been first separated from the adjoining central. Slight, transient pain was experienced for a few days after the operation, whenever she took hot or cold

fluids into her mouth, but this only occasioned momentary inconvenience, the unpleasant sensation ceasing almost immediately. In the fall of 1853, after a slight attack of congestive fever, during convalescence and after her recovery, the pulp of the tooth was so exceedingly irritable that the inhalation even of cold air caused severe pain. In a few weeks inflammation appeared, and although leeches were promptly applied to the gum, and saline purgatives prescribed, its intensity was not abated in the least; it soon extended to the alveolus. The local disturbance, in this instance, not only caused the disorganization of the pulp, but it was also attended by an attack of inflammatory fever.

Mr. Billisurio, dentist, of Sydney, Australia, relates, in the American Journal of Dental Science, the case of a man twenty-five years of age, who, after a "severe wetting," while on his passage from England to that colony, when off the cape, had the pulps of his lower incisors, cuspids and bicuspids attacked by inflammation, which terminated in each tooth in suppuration and alveolar abscess.

The amount of constitutional disturbance arising from inflammation of the pulp of a tooth, depends on the state of the general health, and the nervous irritability of the system at the time. In the majority of cases it occasions but little inconvenience, and disappears as soon as the inflammation ceases, but sometimes it assumes a very alarming character. A case of fatal tetanus, produced by inflammation of the pulp of a lower molar, occurred a few years ago in Baltimore. The subject was a young lady about eighteen years of age. The system, at the time, from great bodily fatigue and mental excitement, was in an exceedingly irritable condition, but in other respects, though constitutionally rather delicate, she was in the enjoyment of good health.

There is not an organ or tissue of the body in which acute inflammation is more intractable in its nature, and rapid in its progress than in the pulp of a tooth; and when we take into consideration its situation, and physical and vital peculiarities, it is not to be wondered, that it should, in so large a majority of the cases, terminate in the disorganization of the part.

Still, it may sometimes be arrested, and the remedial indications here, though they cannot be as readily and fully carried out, are the same as for inflammation in any other part of the body. The first and most important one consists in the removal of all local and exciting causes. If it be the result of irritation produced by the pressure of a filling, the plug should be immediately removed, leeches applied to the gum of the affected tooth, and, if the patient be of a full habit, blood may be taken from the arm, and a brisk saline purgative prescribed. The removal of the filling, however, when the inflammation has previously made much progress, will not prevent suppuration, but it may prevent it from extending to every part of the pulp. When an external opening is made for the escape of the matter the moment suppuration takes place, the remaining portion of the pulp will be relieved from pressure, the cause of the irritation, and then the inflammatory action may cease. But if the matter remains in the central cavity of the tooth, the part of the pulp which has not suppurated will still be subjected to pressure, and the inflammation and suppuration will go on until the entire organ perishes. Nor will the disorganizing process stop here. The alveolo-dental membrane at the extremity of the root, will soon become implicated, and in a short time alveolar abscess will form, thus terminating the acute stage of the disease.

There may be no indications of irritation or inflammation for several weeks, or even months, after a tooth has been filled, but at the expiration of this time, the pulp, from increased irritability, caused, perhaps, by some change in the state of the patient's general health, may be attacked by inflammation. Although this very seldom happens, it does, nevertheless, sometimes occur, and when there is reason to apprehend that it is about to take place, and it may be suspected if pain is felt in the tooth when anything hot or cold is taken into the mouth, or if it becomes the seat of gnawing or gradually increasing pain, the filling should be removed. If the pain now ceases, a thick layer of gutta percha, or "Hill's stopping" may be placed in the bottom of the cavity, and the filling replaced, using the

precaution as before directed, to introduce the gold in such a way as to prevent the liability of depressing the floor of the cavity. But if the pain and inflammation should continue unabated, it may be necessary to extract the tooth, or expose the pulp and destroy its vitality by applying to it some powerful escharotic, as the arsenious, which, acting more promptly and with more certainty than any other, seems best adapted to the purpose. When this is done, it is usually with the view of securing the retention and preservation of the tooth by filling the pulp cavity and root, an operation now very frequently performed by many dentists.

The abstraction of blood directly from the pulp, one would suppose, would be better calculated to arrest inflammation of this organ than almost any other treatment, but I do not think this has been resorted to for this purpose sufficiently often to determine the amount of therapeutic agency it is capable of exerting. At any rate, it seems reasonable to suppose that if, by this means, the congestion of the capillaries could be removed, the tumefied pulp would be reduced to its natural size, and be relieved from the pressure to which, as a consequence of its distended condition, it was subjected. To obtain the largest amount of benefit capable of being derived from the operation, the puncture should be made in that portion where one of the principal arteries would be most likely to be punctured, and this, it seems to me, would be just where the canal of the root enters the chamber of the crown of the tooth. But in making the puncture here, the pulp being very small at this point, there is danger of cutting it off, and as reunion would scarcely be likely to take place, the portion in the central cavity would necessarily perish. I have made the operation *(odontry'py)* three times, and in two of the cases it at first appeared to have been successful, it having been followed by immediate cessation of pain, but this, as I afterwards ascertained, was either owing to the complete division, or the division of so large a portion of the pulp, that the part in the crown soon died, the drill having entered the canal in the root a little above the chamber of the the tooth. In the other case, the inflammation having never

reached its height, the operation increased the severity of the pain, and an hour or two after its performance, at the earnest solicitation of my patient, I extracted the tooth.

If the pulp were exposed, there would be a better opportunity of relieving the congested condition of its capillaries by the abstraction of blood, but the difficulty of obtaining free access to the organ by drilling a hole through the intervening dentine is so great, the tooth, when suffering from inflammation, being usually so sore to the touch, that the slightest pressure is productive of great pain, hence, the operation will seldom if ever prove successful. Unless, therefore, the retention of the tooth is a matter of more than ordinary importance, it is better to remove it at once. But if it is an incisor or cuspidatus, the pulp should either be immediately extirpated or arsenious acid applied for the destruction of its vitality; or, if suppuration has previously taken place, an opening should be made into the chamber of the tooth as before directed, for the escape of the matter. Should it be found, after this has escaped, that disorganization has not extended to every part of the pulp, the remaining portion may be destroyed in the manner as above described. This done, the pulp cavity and root, as soon as the inflammation of the socket has completely subsided, may be filled.

It will be seen from the foregoing remarks, it is only at its very inception, that there is any chance of combating successfully acute inflammation of the pulp of the tooth, and even then, so rapid is the progress of the disease, it may baffle the best directed and most energetic treatment that can be adopted. It may be that when attention shall have become more generally directed to the subject, that some more successful method of treatment may be discovered, but that a complete mastery over the disease will ever be obtained, is not to be expected.

But inflammation of the dental pulp is not always acute; it sometimes assumes a chronic and local form. This often occurs where the chamber of the tooth has become gradually exposed by caries of the dentine, and when it happens, the action of the fluids of the mouth, and other foreign substances which obtain access to the cavity, as well as the decomposed portions

of the tooth substance, cause an increase of vascular action in the exposed part, followed, very often, by a slight discharge, but the morbid action thus induced is, comparatively seldom, accompanied by pain. The pulp may remain thus partially exposed for months, and even years, without causing any other inconvenience than a momentary twinge of pain when some hard substance is accidentally introduced into the cavity of the tooth, which subsides immediately after its removal. Sooner or later, however, the pain thus excited will become more permanent, continuing each time it is produced, from five or ten minutes to one or more hours after the cause of the irritation has been removed. If a tooth be filled under such circumstances, the pressure of the fluid upon the pulp, which is poured out from its exposed surface beneath the plug, will give rise to a more general and active form of inflammatory action.

The liability of the tooth to ache increases as the pulp becomes more and more exposed by the gradual decomposition of the dentine, and the inflammation may ultimately assume a more active form, or the pulp may become the seat of fungous growth, or be absorbed or destroyed by ulceration, or gangrene and mortification. Cases sometimes occur in which the disease is attended with severe darting pains, occurring, very often, several times in the space of two or three minutes, succeeded by intervals of perfect ease of as many hours. At other times it is attended by dull aching pain, which is aggravated by taking sweet or acid substances into the mouth. In cases of this sort, the application of heating or stimulating substances to the exposed surface of the pulp, will usually procure relief. Permanent exemption from pain, however, is rarely obtained, and sooner or later, it becomes necessary either to destroy the pulp or extract the tooth.

The body of the pulp, when the organ becomes exposed from a decayed opening in the grinding surface of a molar, is sometimes absorbed, while the prolongations in the roots often remain unchanged for two, three or more years. But when it becomes exposed from an opening in, and confined to, any of the other surfaces of the crown, it is rarely thus removed.

Chronic inflammation of an exposed surface of the pulp, when long continued, sometimes gives rise to *ulceration*—a disorganizing process which often causes the destruction of a large portion of the part occupying the central chamber of the crown of the tooth, making in it numerous little excavations. The ulcerated surface usually presents a yellowish appearance, and when the disorganizing process is arrested before it has effected the destruction of a very large portion of the pulp, it usually becomes covered with healthy granulations.

When the inflammation occurs in cachectic individuals it often assumes an acute form, and sometimes terminates in gangrene and mortification. The loss of vitality may be confined to the body of the pulp, or it may extend to every part of the organ. In the former case the pain continues, but in the latter it ceases as soon as mortification takes place. When this happens, the entire pulp, which has now a dark brown or black color, may be removed. But this is not a very common termination.

The symptoms of chronic as well as acute inflammation are always modified by the state of the general health, habit of body, and the temperament of the individual. The pain attending the former, however, is periodical, occurring at irregular and uncertain intervals, and constitutes that variety of tooth-ache so often relieved by local applications, whereas, in the latter, it is constant.

In chronic inflammation, the pulp is either actually exposed or only covered by decomposed or partially decomposed dentine, and the diseased surface rarely embraces a larger circumference than that described by the bottom of the decayed cavity. The inflammation, therefore, is local as well as chronic, but nevertheless, it is often of so persistent a character, as to render its removal exceedingly difficult. The dentist, however, is not so much restricted in the application of remedies as in the treatment of acute inflammation, and to the action of which it yields more readily. But notwithstanding all this, he will necessarily encounter difficulties in his efforts to subdue it. A greater length of time is

sometimes required than the patient is willing to give, and the opening through the crown to the central cavity is, not unfrequently, too small, previously to the removal of the partially decomposed dentine, to admit of the direct application of the necessary remedial agent to the inflamed surface of the pulp. Again, it often happens, that the situation of the tooth and cavity are such as to prevent him from obtaining a complete view of the diseased part, and it is important that he should do this to enable him to determine whether the inflamed surface is ulcerated, or pours out a serous fluid, or whether the morbid condition consists merely of irritation, produced by the presence of acid matter, or of partially or wholly decomposed dentine. Unless his diagnosis is correct, his prescription will be as likely to do harm as good. But, having ascertained the exact character of the disease, he may often be able to institute treatment that will result in the restoration of the pulp and the preservation of the tooth.

It is important, too, that he should understand the part which nature plays in the curative process, for cure here, as in the case of the cure of disease in other parts of the body, is effected by that internal force, which, as Chomel says, "presides over all the phenomena of life, contends unremittingly with physical and chemical laws, receives the impression of deleterious agents, reacts against them and effects the resolution of disease." This vital force is sometimes efficiently exercised for the cure of disease in the pulp of a tooth, but more frequently for its prevention, as is shown by the gradual ossification of the organ in those cases where it would otherwise become exposed by mechanical or spontaneous abrasion of the solid structures which enclose it, and occasionally by the formation of new dentine upon its surface at a point towards which caries is advancing. Nature, no doubt, would always provide in this way against the exposure of the pulp, if the occurrence was always preceded for a sufficient length of time to enable her to do so, by sufficient irritation or increase of vascular action in it to call her energies into operation. But the formation of new dentine, which constitutes the protective wall of defence, is a tardy process, and as a general rule, proceeds more slowly than the ca-

ries in the tooth, which causes the exposure of the pulp. Besides, it often happens that its approach is not announced by the slightest irritation, a condition necessary to the new formation, until it reaches the central cavity. At other times, the approach of the disease gives rise to too much irritation, a condition equally unfavorable to ossification of the pulp. Thus no protective covering being formed, it soon becomes exposed, when it is subjected to the action of such irritating agents as may chance to be brought in contact with it. Hence, its liability to become the seat of chronic inflammation as well as other forms of diseased action.

If the disease be attended with pain, the removal of this should first claim attention, and this should be effected with as little delay as possible, otherwise the morbid action may extend to every part of the pulp and peridental membrane, and assume a more active and unmanageable form. If the pain is the result of irritation produced by the direct action of mechanical or chemical agents, the cavity in the tooth should at once be carefully freed from all extraneous substances and the decomposed portions of dentine. This done, a dossil of raw cotton or lint, saturated with spirits of camphor, laudanum, sulphuric ether, chloroform, creosote, or some one of the essential oils may be applied. Immediate relief is sometimes obtained by an application of this sort. Counter irritants have sometimes been used with advantage. The pain has often been removed by exciting increased secretion of saliva, but when a sialagogue is used, the cavity in the tooth should be filled with raw cotton or lint to prevent the agent from being brought in contact with the exposed surface of the pulp. But a remedy which will relieve the pain in one case often aggravates it in another.

When the irritation is produced by acidulated buccal fluids, the application of carbonate of soda or some other alkali, will often give immediate temporary relief, but as the condition of the secretions of the mouth, especially of the salivary, is usually owing to gastric derangement, the correction of this constitutes the first and most important remedial indication. When any application is made to the pulp for the purpose of removing irritation and pain, their full effect will not be obtained unless

the fluids of the mouth are excluded from the cavity of the tooth, and this may be done by closing the orifice with softened wax or mastic, using the precaution not to force it in so far as to press the application, previously introduced, upon the nerve.

Chloroform, from its powerful anæsthetic properties, is now regarded as one of the most efficient antiodontalgic agents that has ever been employed, especially in those cases where the pulp of the tooth is actually exposed. I have used it, after having dissolved gutta purcha in it until it was of the consistence of molasses, with the most satisfactory results, and in two cases, after the pulp had become the seat of chronic inflammation, with complete success. One of which I will describe.

Mrs. W——, wife of a medical gentleman residing near Baltimore, of a sanguino-bilious temperament, and about twenty-eight years of age, applied to me in the summer of 1851, for my professional aid. The second molar on the right side in the lower jaw had a large cavity in the grinding surface, which, at one point, had penetrated to the pulp. The tooth having frequently ached, I advised her to have it removed, but she could not be persuaded to submit to the operation. After removing the foreign matter and decayed dentine, the exposed surface of the pulp presented a reddish appearance, the capillaries of this part having become injected with red blood. The tooth was aching at the time, and under these circumstances, the cavity was filled with raw cotton, saturated with a thick solution of gutta percha in chloroform. The pain ceased immediately, and a few minutes after she left my office, promising to return and have the tooth extracted if it should again become painful. Two months elapsed before I saw her, and up to this time her tooth had given her no further trouble, the cotton having remained in it during the whole period of her absence, and it was with some difficulty that I succeeded in removing it, as it was firmly imbedded in the gutta percha, which had remained after the chloroform had evaporated. I now dried the cavity carefully and filled it with Hill's stopping, leaving a small space between the filling and the exposed pulp. At the expiration of about eight months, agreeably to my request, she called on me again,

when I replaced the temporary filling with a permanent one of gold, having previously, however, placed a thin layer of gutta percha on the bottom of the cavity. The tooth has subsequently remained free from pain.

Until within the last three or four years, I did not believe it possible to preserve the vitality of a tooth by filling after the pulp had become the seat of chronic inflammation, but am now convinced that it can be done in very many cases, but to effect which several weeks of preparatory treatment are often required. I have succeeded in fully one-half of the cases which I have treated since the commencement of 1852, and it is probable, that when the pathology and remedial indications of the diseases of the dental pulp shall be better understood, greater relative success may be had in the treatment of the disease in question. The practicability of restoring teeth to health and usefulness after the pulp has become the seat of pain and actual disease, has hitherto been regarded by all, as beyond the reach of the dentist's skill.

In a conversation with Dr. W. W. Codman, of Boston, in 1850, this gentleman informed me, that he had succeeded in inducing ossification of the dental pulp by removing the decomposed dentine and keeping the cavity in the tooth filled with raw cotton. The time required to effect this, varying from eight to fifteen months, and during this period he directs that the cotton be renewed, at least, once a day. By this simple treatment, Dr. C. assured me that he had succeeded in numerous instances in exciting ossific inflammation, and a bony covering having formed over the pulp, he filled the cavity in the tooth without fear of subsequent trouble. Whether this treatment was adopted in cases where chronic inflammation of the pulp existed, or only where this organ was in a healthy condition, I am not able to say, as I do not recollect that the subject was alluded to at the time of our conversation. Dr. W. H. Dwinelle, of Cazenovia, N. Y., recommends the use of tannate of lead and spirits of camphor, which seems to have been more successful in his hands than most other remedial agents employed for irritation or inflammation of the dental pulp. He recommends the use of friction with a view of exciting ossific

inflammation, and this may sometimes be attended with a very good effect, especially, if the morbid action is dependent in part upon want of sufficient vital energy in the pulp to induce a deposit of bony matter on the exposed surface.

[To be Continued.]

ARTICLE III.

Report upon the Rise, Progress and Prospects of Mechanical Dentistry, read before the Associated Alumni of American Dental Colleges, at the Baltimore College, March 18, 1854. By M. D. FRENCH, D. D. S.

AT a meeting held in this place in March, 1853, for the purpose of organizing a dental society, to be called the Associated Alumni of American Dental Colleges, you did me the honor to appoint me to prepare and read, a t your second annual meeting, a report on mechanical dentistry. I am fully sensible of the important and responsible nature of the duty, which this flattering expression of confidence has imposed, and the consciousness of my inexperience and inability to do the subject justice, tends to augment the natural embarrassment, and occasion much anxiety that my efforts should meet your approval; if, however, an earnestness of purpose and an honest desire to contribute to the advancement of this department of science, can give these efforts any merit, I shall at least have some slight claim upon your favor.

Before entering upon a review of the various appliances necessary for the correction of irregularities in the arrangement of the natural teeth, of the different methods adopted in the construction of artificial substitutes, of palates, obturators, &c., and the manipulations connected therewith, I shall make some general remarks relating to the history and progress of this important branch of our profession.

It must be a source of no small gratification to every lover of

the profession to know, that in the last thirty or forty years, a period fruitful in improvements and discoveries, which the philosophers of any former period would have deemed incredible, dental science has taken the lead in the onward march, and achieved triumphs of which the annals of any other profession scarcely afford an example.

Previous to this time the history of dentistry is but the record of ignorance and quackery. Despised and neglected by men of science, it fell into the hands of barbers and mountebanks, whose knavery and presumption was only equalled by their ignorance, and thus a noble art, capable in its present state of excellence, of conferring inestimable blessings upon mankind, became, in the hands of such practitioners, a formidable instrument of disease and torture. Totally destitute of all the essential qualifications of the dentist, and having no other claim upon the confidence and patronage of the public, or right to perform operations requiring manual dexterity, combined with a knowledge of anatomy and pathology, than that which they might urge by virtue of their having assumed the title, they pursued a system of ignorant and barbarous practices which the ancient Egyptian, could he have come forth from his catacomb and witnessed, might have blushed to own was characteristic of the time of his own existence.

Yet in the midst of this chaos of ignorance, dentistry engaged the attention of a few individuals whose talent and genius shown out as brilliant meteors amid the surrounding intellectual darkness, and whose works gave to the profession a certain degree of importance; still, comparatively, little was done to develop its hidden resources and raise it from the degraded position in which it had so long slumbered, until a period within the memory of men still in the profession.

Most of the theoretical dental knowledge then possessed was derived from the works of the celebrated John Hunter. His treatise upon the teeth, opened up a wide field for subsequent study and investigation, and the novel and interesting nature of the subject naturally attracted the scientific and curious.

Such men as Fox, Delabarre and others, whom I might mention, devoted their energies to the advancement of the science.

Yet dental surgery cannot be said to have taken the position to which its importance so justly entitled it, until the time of Mr. Bell, who wrote in 1829.

His work upon the anatomy, physiology and pathology of the teeth, by demonstrating them to form an integral part of the animal economy, and pointing out the important relations and sympathies which they maintain with the surrounding and distant parts, thus showing a knowledge of them to constitute an essential element of a thorough medical education, gave to the study and practice of dentistry an importance which it had never before attained.

Men, justly famed for their talent and learning, medical men skilled in their profession, turned their attention to it, and devoted their energies to the augmentation of dental science, and under the patronage of such men it rapidly advanced in public confidence and respectability. Although a majority of the profession has ever been, and still is, composed of persons whose pretensions to science and professional worth are but base mockeries, the number of her educated members has rapidly increased, and dentistry has gradually won its way to a rank among the liberal professions.

It is a lamentable fact, that for many years, while dental anatomy, pathology and surgery were rapidly advancing in importance and usefulness, that branch of the profession which relates to the supplying artificial dentures and the correction of irregularities in the arrangement of the natural teeth, seemed to lie in abeyance. Until a very recent period, the knowledge in this department of dentistry was exceedingly limited and imperfect, and it is a matter of surprise and regret that the early writers on the subject should have given so little attention to that branch of the art so absolutely essential to the successful practice of the profession as mechanical dentistry.

Of the French and English writers, Delabarre, Koecker and a few others, were the only authors who have given anything like an accurate description of the principles upon which artificial teeth are inserted, and the various methods adopted in the process of their construction, until Mr. Robinson, a late writer,

whose work on mechanical dentistry contains much valuable information.

In 1846, Dr. Solyman Brown wrote a series of papers on this branch of the art, which were published in the American Journal of Dental Science, in which he described very minutely, not only the principles upon which artificial teeth are applied, but all the different methods used in the process of their insertion.

The work of Dr. Brown contained all the information possessed on the subject at the time, and constituted the best and most complete work which had then been published.

Since the publication of Dr. Brown's treatise, there have been numerous important improvements in this branch of the profession, which may be found accurately described by Dr. Harris, in his Principles and Practice of Dental Surgery, a work for its lucid and scientific exposition of dentistry, every way worthy of the experience and high attainments of its author, and which, I take for granted, is in the hands of every man ambitious of excelling in the profession.

Having made these general remarks in order to show the rapid advance which the science has made with a view to a better appreciation of the advantages and facilities enjoyed by the profession at the present time over that of any former period, I shall endeavor to point out, as far as pertains to the mechanical department of the art, what those advantages and facilities are. I shall avoid all minute descriptions except such as may be necessary to indicate the different methods adopted for the attainment of the same end, and to show the advantages of the one over the other.

The manner of correcting Irregularities of the Teeth.—The most aggravated and complicated cases of irregularities, if taken while the patient is quite young, may be remedied by a judicious application of mechanical pressure. The principle upon which they are corrected is the same in all instances, and a practical knowledge of that will enable any one possessing skill and ingenuity to adopt his appliance in such a manner as to overcome the most difficult and obstinate irregularities. The prop-

er manner of applying it must be determined by the peculiarities of the case.

It frequently occurs when the irregularity is slight and occasioned by a crowded condition of the teeth, that the removal of the cause will be sufficient to remedy the evil. Where the crowded condition of the teeth renders the removal of any of them necessary, one should be extracted from each side, and when the proper teeth to be removed are not indicated by caries, and the space between the lateral incisor and first bicuspid is equal to one-half the width of the cuspidati, the second bicuspid should be selected ; but when the space between the lateral incisor and first bicuspid is less than one-half the width of the cuspidati, the first bicuspid should be removed. Of the various plans proposed for the correction of irregularities in the teeth, the inclined plane of Catalan, and the use of ligatures, by means of a gold bar bent to correspond with the dental circle, as recommended by Mr. Fox, are almost the only means which have come into general use, and are acknowledged to be the best ever adopted.

There is another method which I am not aware has ever been practiced, and which, from experience, I can recommend, confident that it will be found to possess some important advantages, both for comfort and utility, over any other means. This consists of a plate of silver, accurately adapted to the roof of the mouth, and secured with clasps to the molar teeth, and by means of gold springs, or spiral springs, soldered to the plate, a constant and steady pressure may be applied to the teeth in any direction. The arrangement of the springs will, of course, be determined by the peculiar circumstances. In cases where it is necessary to exert a constant outward pressure, spiral springs enclosed in tubes should be soldered to the plate in such a manner that the ends of the springs shall press upon the teeth in the required direction. Now, the advantages of this method over any other are, that it does not require to be rearranged every three or four days, as is the case when ligatures are used ; it can be worn with but slight inconvenience, except that occasioned by the pressure on the teeth ; it can be taken out and re-

placed at the will of the person wearing it, and does not occasion that unsightly appearance presented by the gold bar and ligatures.

Substances used for Artificial Teeth.—These are human teeth, teeth of cattle and sheep, teeth carved from the ivory of the tusks of the elephant and hippopotamus, and porcelain teeth. Human teeth, and those carved from ivory, have been in use since the earliest history of mechanical dentistry.

For beauty of appearance and congeniality with the mouth, the human teeth, when they are properly chosen and arranged, are, perhaps, superior to any others; they should be selected from the same class as those for which they are to be substituted, and when they are of a dense firm structure, with perfectly sound enamel, they will sometimes last for fifteen or twenty years.

Their susceptibility to the chemical actions of the fluids of the mouth is much greater than that of those having a vital connection with the adjacent parts, and unless they are of good quality, and the mouth in which they are inserted be in a healthy condition, they seldom last longer than from three to five years. Teeth carved from ivory, while they possess none of the advantages ascribed to the human teeth, their white opaque appearance always giving to the countenance a sickly and disgusting aspect, are much more permeable, and consequently more readily destroyed by the acids of the mouth.

By absorbing the fluids of the mouth, they turn black almost immediately, and when many of them are worn in the same mouth, they impart an exceedingly offensive odor to the air which is returned from the lungs, which of itself should constitute an insuperable objection to their use. So numerous and palpable are the objections to all animal substances for artificial teeth, that the leading members of the profession everywhere have abandoned their use, and in this country porcelain teeth have become almost universally adopted. The advantages which mineral teeth possess over all others are confessedly great. They can be more accurately adapted to the mouth and plate; they are not affected by the deleterious fluids of the

mouth, and if proper attention is paid to their cleanliness, they never change color, and by the indefatigable labors of a few men, the art of their manufacture has been brought to such a degree of perfection, that they can be made to resemble so closely the natural organs as frequently to escape detection even by the most practiced observer.

Manner of Securing Artificial Teeth in the Mouth.—The different methods adopted for the retention of artificial teeth in the mouth are, the engrafting of artificial crowns on the fangs of the natural teeth, inserting them on plates secured by means of clasps, spiral springs and atmospheric pressure.

The plan of inserting artificial teeth upon natural roots has for a long time been in general use, and is, when circumstances are favorable to its application, the best that can be adopted.

The high estimation in which it has ever been held, and the facility with which the operation may be performed, has occasioned many to forget the conditions absolutely necessary to success, and to perform the operation indiscriminately, and too often under circumstances, the nature of which render success impossible.

In order to derive permanent advantage and benefit, the root upon which the tooth is engrafted must be in a healthy condition, and the practice which some have of inserting teeth upon diseased roots, or fangs having diseased sockets, should be repudiated by every respectable dentist. Unfortunately, the incisors and cuspidati of the upper jaw are all that can be replaced in this manner; all the rest, and these, when the roots are gone, require teeth inserted upon a plate.

In most cases of partial sets inserted upon plates, the use of clasps becomes necessary. It is true, that such plates may be retained by atmospheric pressure, but in cases of less than eight or ten teeth, where the arrangement of the remaining natural teeth is favorable, I regard the use of clasps as far preferable to any other method.

In this way the teeth may be much more firmly secured, thereby rendering them more capable of performing the functions of the natural organs which they replace, and when accu-

rately fitted they need occasion but very slight injury to the natural teeth. The use of spiral springs and atmospheric pressure are, except when the suction method is resorted to for the retention of partial upper sets, adapted to cases precisely similar. When they are not used in connection, either one or the other is made to subserve the purpose of the two. When the gums are soft and spongy, or when from disease, they are continually undergoing change in form, spiral springs may be used with advantage, but I regard them as useless and unnecessary in every instance of sound healthy gums. If the plate has a properly constructed air chamber and is accurately adapted to all the inequalities of the gums and palate, success in the operation is inevitable, and if we urge the necessity of springs in such cases we do but acknowledge our inability to fit the plate to the mouth accurately.

Inserting Pivot Teeth.—Artificial crowns are secured to the roots of the natural teeth by means of pivots made of wood or metal. When the former is used it should be of the best quality of seasoned hickory, and when the latter, platinum or fine gold should be selected, as any other metal would become more or less oxydized by the fluids of the mouth. Much diversity of opinion exists in regard to the material that should be used for pivots. Some prefer the simple gold pivot, or a metallic pivot encased in a thin layer of wood, and others again, wood to metal in any form.

The use of the metal, and the plan of inserting a hollow gold screw into the canal in the root for the reception of the pivot, I believe is, unquestionably, the best that can be employed; the tube effectually protects the walls from the action of all corrosive agents, thus preventing the enlargement of the canal by decay, as is always the case when the tube is not used, and although it is a more tedious and expensive operation, the advantages which it confessedly possesses, should recommend it to the favorable notice of every practitioner. The success of the operation is rendered still more sure and complete by filling the root from the upper extremity of the tube to the apex of the fang.

A tooth, thus inserted, may be removed, cleansed and replaced

at the will of the patient, and if the operation has been skillfully performed, it will stand twice as long as a tooth inserted in any other way.

Taking an Impression of the Mouth.—The best materials for this purpose are white or yellow wax and plaster of paris. The former is always used for taking impressions of the lower jaw, and generally for partial sets in both jaws, some even prefer it for full upper sets, but a great majority of dentists give plaster the preference in such cases. The manner of taking a wax impression is too well understood to require any description. Plaster of paris is sometimes used with much advantage for partial sets, but it is more particularly adapted for full upper sets, in which case it is always preferable to wax, the moist plaster, from its soft and yielding nature, requires little pressure in its application, thus securing a very accurate impression, whereas the force necessary to apply the wax must somewhat displace the soft parts and render the impression less perfect. In procuring a plaster impression of the mouth, a plate struck upon a model made from a wax impression, or a wax-holder with a border of wax so attached as to stop up the open ends and increase the depth of the ordinary rim, so that when the plaster is applied to the mouth it will completely encase the alveolar ridge, is generally used for introducing the plaster into the mouth, but the method which I have recently adopted, and which I think possesses some advantages, is to take an impression of the mouth in wax, then remove all the superfluous wax and cut away the wax from the inner side of the rim so as to admit a body of plaster between the outer surface of the alveolar ridge and the wax, and with this proceed to take the plaster impression.

Getting up Plaster of Paris Casts, Metallic Models and Counter Models.—It is a very simple affair to take a plaster cast; a batter of plaster of paris has merely to be poured into the impression and allowed to remain there until set.

For procuring a metallic cast and counter cast, various means are adopted. A composition of mercury, bismuth and tin, which melts at a temperature of less than 200° F., is sometimes used.

This prevents the necessity of making a plaster cast, as the compound, when melted, is poured at once into the impression, but as this makes the cast less perfect than either of the following, I prefer them, particularly the latter. Zinc and tin being combined in the proportion of three of zinc and one of tin for the male cast, and lead alone or tin, which is better for the counter cast, should be used.

The first plan is to make a counter model by dipping the plaster cast into the melted lead, and into this counter model the molten zinc and tin is then poured to form the male cast. The other method is to mould the plaster cast in sand and into this mould to pour the melted zinc and tin, which forms a metal cast, which is then dipped into the molten led or tin, and forms the counter cast. Some difficulty occasionally exists in drawing the cast from the sand by reason of the projection of the alveolar ridge, which causes the sand to draw in removing the cast, thereby rendering the metallic cast somewhat imperfect, but these defects can be easily remedied, by, before the metal cast becomes quite cool and is in a soft state, cutting away the parts with some sharp instrument so as to make it correspond to the original plaster model. The difficulties may be avoided altogether by using Dr. George Hawes' recently invented moulding flask.

Metals for Plates.—Gold, palladium and platinum are the only metals which should ever be employed as a basis for artificial teeth, because they only are capable of withstanding the chemical actions of the fluids of the mouth, except for temporary sets, when silver may be used with less expense and will answer the purpose quite as well. Gold is almost always used, except when the teeth are united to the plate by means of a silicious cement, in which case the piece has to be subjected to a high degree of temperature and the use of platinum becomes necessary.

Gold, employed as a basis for artificial teeth, should be at least eighteen carats fine for lower and partial sets, and twenty for full upper sets. For upper plates it should be in thickness from 25 to 27 Stub's gauge, and for lower plates, backings and clasps, from 22 to 24.

Swaging up Plates.—Before attempting to swage the plate between the casts, it should be partially fitted to the male cast with a wooden hammer; without this precaution, it is liable to mutilate the cast, and thus occasion an imperfect adaptation of the plate. During the process of swaging, the plate should be annealed six or eight times, and if any portion of the zinc or lead should adhere to the plate, it should be carefully removed before annealing, as the fusion of these metals upon its surface would render the gold brittle and liable to crack. To avoid the danger of such an occurrence, it is well to oil the plate before striking it between the dies. After the plate has been perfectly adapted to the cast, it should be fitted to the mouth previous to attaching the teeth and clasps.

Fitting the Clasps.—This is an operation requiring nice manipulation, and upon the manner in which it is performed, depends much of the success of the operation.

The clasps having been accurately fitted to the teeth in the patient's mouth, the plate should be adjusted, and the two united by a cement composed of wax, one or two parts, and resin one, previously warmed, and applied to the plate and each clasp. The whole should then be carefully taken from the mouth and imbedded in plaster, after which the cement should be removed and the clasps soldered to the plate.

The clasps and plate are usually fitted and attached on the plaster cast, but as the adaptation cannot be thus made so perfect as when they are fitted to and united in the mouth, I award the latter method a decided preference. It sometimes happens that the teeth do not stand in a vertical position, and it is impossible to remove the plate and clasps when attached with cement, without changing their relative position. In cases of this sort, the plan recommended by Dr. Fogle, of attaching them by means of a strip of gold, about a half an inch long, bent so as to form a semi-circle, soldered to the plate and clasps, may be found very serviceable. Clasps united to the plate in this manner may be removed without difficulty. There is another method suggested by Dr. Noble, which is valuable in cases of this sort, which is the use of plaster of paris, instead

of cement, for uniting the clasps to the plate in the mouth, for a description of which, I shall refer you to Dr. Harris' work.

The manner of Procuring an Antagonizing Model.—Getting up a model for antagonizing a partial set, when the remaining teeth in one jaw antagonize with those in the other, is a very simple operation. The clasps having been soldered to the plate, a rim of wax is placed upon it, and the whole is applied to the mouth. The patient then closes the mouth until the teeth in the upper and lower jaws come together, imbedding the teeth in the lower jaw in the wax. The piece is then removed, placed upon the plaster model and covered with a batter of plaster of paris, which, by filling the impressions in the wax, made by the teeth in the lower jaw, shows, when dry, the exact relation which those teeth sustain to the teeth in the upper jaw.

For obtaining an antagonizing model for full upper sets, or double sets, the method of placing a rim of soft wax upon the plate, or if a double set, between the two plates, with a piece of wood corresponding in width to the length of the required artificial teeth, introduced through the wax at a point corresponding with the median line, and having the patient close the mouth upon the wax until the teeth and plate, or the two plates, as the case may be, shall strike upon the wood, is very frequently adopted. But as there is considerable uncertainty in regard to the result of this operation, in consequence of the inability of the patient to close the mouth naturally, the following method may be regarded as preferable.

A rim of wax is placed upon the convex surface of the plate, and cut away until it shall correspond in width to the length of the proposed artificial teeth, and also strike the natural teeth in the other jaw on both sides, at the same instant. It is also trimmed on the outer surface, to give the proper contour to the cheeks and lips. This done, it should be removed, and the plaster applied in the same manner as in cases of partial sets.

In procuring an antagonizing model for a complete double set, the wax upon the upper plate is arranged in the same manner as described above.

After having adjusted a rim of warm wax upon the lower plate, they are both applied to the mouth, the wax on the upper plate being cold and hard, and the mouth closed, imbedding the rim on the upper plate in the wax on the lower plate. The impression thus made in the wax will serve as a guide in cutting it away on its outer and inner surface. It should be trimmed, so that when the mouth is closed and the relative position of the jaws perfectly natural, the two waxes shall exactly correspond in thickness, and meet all the way round. After this is accomplished, the two are firmly secured together by means of pins, and the whole removed from the mouth, and the antagonizing model completed by applying the plaster to the plates in the usual manner. In this way, if care is used in trimming the wax, and in closing the mouth, previous to uniting the waxes, the proper relation of the plates on the antagonizer can be secured with unerring accuracy.

Mounting Single Porcelain Teeth upon a Metallic Base.— The usual manner of mounting single plate teeth is to attach them to the plate by means of gold standards secured to the backs of the teeth by platinum pins put in the teeth during the process of their manufacture, and soldered to the plate. Without attempting to detail the various methods of procedure adopted by different dentists in attaching single teeth to a metallic base, I shall endeavor to describe as briefly as possible that plan which is most generally practiced, and which, for simplicity combined with utility, is certainly preferable to any other. The teeth having been accurately fitted to the plate, and arranged according to the antagonizing model, and held in their proper places by a rim of wax on their inner surfaces, a paste of plaster of paris and fine sand, or a batter of equal parts plaster and asbestos should be applied to the palatine surface of the plate and to the outer surface and coronal extremities of the teeth, to the thickness of from a quarter to a half an inch.

To prevent the displacement of the teeth in case the plaster should crack during the process of soldering, the piece and plaster should be enclosed in a hoop made of a strip of sheet

iron about three-fourths of an inch wide. When the plaster and asbestos have become dry, the teeth should be removed, one at a time, and a standard placed upon the back of each, and accurately fitted to the plate. The holes should be countersunk on the back part of the plate, so as to permit a head on each pin to prevent their drawing. They should then be secured to the backs of the teeth by uniting the platinum pins with a pair of punching forceps. In doing this, a thin piece of cork should be interposed between the labial surface of the tooth and the instrument, and with the punch on the end of the pin, the force is applied in the same manner as in punching a plate. In this way, the pins can be nicely headed without danger of fracturing the tooth.

Some dentists secure the backings to the teeth before soldering, by bending the pins in opposite directions. When this is done, the standards are only held to the pins by a union with the solder, and unless an unnecessarily large amount of solder is fused upon the surface of the backing, it is much more liable to break, and the rivets draw, than when they are properly headed.

The practice of riveting the pins with a light hammer is even more objectionable than this, because the concussion which attends the use of the hammer not unfrequently starts the pins in the teeth, and although the injury thus occasioned may not be observable at the time, a few months, or even weeks, of actual service, may suffice to bring it to light by the rivets breaking out, and the teeth coming off.

The pins should not be riveted so closely as to prevent the solder from flowing around them and firmly uniting them to the backings. This effect will be rendered the more certain by taking the precaution to put a little borax around the pins previous to heading them.

The teeth all having been backed and readjusted in the plaster, borax and solder should be applied to the pins, and at the line of union between the standards and plate, and the whole soldered at once. In soldering, it is important that the heat should be applied gradually, and in such a manner as to

preserve an equal degree of temperature throughout the piece, as the solder flows better, and the plate is much less liable to spring from unequal expansion under such an application of heat, than when one portion of the plate is suddenly heated to a degree of temperature much higher than the rest. Some diversity of opinion exists in regard to the best means of applying heat for the purpose of soldering. A variety of ingenious contrivances have been invented for this purpose, some of which are often used with advantage. The furnace and blow-pipe, invented by Dr. Somerby, of Louisville, Ky., and the self-acting blow-pipe, by Dr. Parmly, of New York, are, perhaps, the best that has ever been given to the profession.

The ordinary spirit lamp and common mouth blow-pipe are the most frequently employed, and to one who is skilled in its use, it is preferable to any other.

Securing Single Teeth in a Base of Tin.—The method of constructing an artificial substitute for the natural teeth in the inferior maxilla, by securing the teeth in a base of tin, was first practiced by Dr. Hudson, of Philadelphia, as early as 1820. I am not aware, however, that he ever adopted it generally in his practice. It never had claimed much attention, indeed but very little was known about it until the publication of a treatise upon this subject, in the American Journal of Dental Science, in 1850, by Dr. Hawes, of New York, although Dr. Royce, of Mewbury, New York, had constructed a denture on this plan in 1836. Dr. Hawes, whose experience in this manner of mounting teeth for under sets has been somewhat extensive, believes it, in all cases of whole or fractional under sets of artificial teeth, to be superior to any other method, and since the publication of his article on the subject, it has occasionally been employed by a few dentists. As it is not generally approved of by the profession, I do not deem it necessary to make any remarks upon its merits or demerits.

Single Plate Teeth mounted upon a Metallic Base, with Continuous Artificial Gums.—The principle of uniting single porcelain teeth to each other, and to the plate upon which they are set by means of a fusible silicious cement, which flows in

and around the base of the teeth, upon the plate, in such a manner as to form a continuous artificial gum, was originated in France, and although it had been practiced there since about the year 1820, it never attained a degree of perfection sufficient to give it any advantage over the ordinary method of mounting single teeth until 1851, when it was introduced into the profession in the United States, almost simultaneously by Dr. John Allen and Dr. W. M. Hunter, both of Cincinnati, Ohio. The composition employed in this style of work is used on plates of pure platinum, or twenty-two carat gold, alloyed with platina.

The teeth and gums are modeled to the plate, and the whole is then subjected to an intense heat, until fusion of gum takes place, when the teeth become firmly united and attached to the plate. By this method, the cavities between the teeth and between the teeth and plate, which are unavoidable in the old style of mounting single teeth, are completely filled up, leaving no chance for the lodgement of extraneous matter more than must always exist in the most perfectly mounted block teeth.

A piece of work can be made in this way in about one-half the time that is required for putting up a set of block teeth, and in the hands of most dentists would be superior in point of beauty, and if the test of experience shall prove that a denture constructed on this plan possesses the requisite strength and durability, it is certainly superior to any which has ever been practiced by the profession, and must, sooner or later, supersede all others. I am not, however, fully satisfied that such will ever be the case, for during the process of mastication, the plate is liable to spring and the gum crack off, and many dentists who adopted it practiced it only to find their high hopes of its ultimate success disappointed, and have hence abandoned it altogether. To what extent these unfortunate results may be attributed to an improper manner of compounding and working the material, or an imperfect adaptation of the plate to the mouth, it is impossible to say.

This objection to this plan of mounting single porcelain teeth

we are told can be easily overcome by replacing the loss with composition, and fusing it to the plate, and fractured edges of the remaining portion of the gum. It is true that this may be done once, or even twice, without material injury to the piece, but if the operation is frequently repeated, the color in the gum is bleached by the action of the heat, and a new gum rendered necessary.

The process of restoring the color of the gum by fusing upon its surface a second coat of enamel, is always attended with more or less injury to the denture. The gums frequently assume a dark purple color, and this combined with the fulness around the necks of the teeth, occasioned by the second application of enamel, often gives to them the appearance, when in the mouth, of turgid and swollen gums. Occasionally it happens, that during the process of fusing the enamel, the gum is blown to such an intent, as if not to render them absolutely unfit for use, to give them a most unnatural appearance.

Now, if the fractures which occur in this sort of gum, cannot be repaired except at such imminent risk of injury, or totally destroying the beauty and natural appearance of the whole piece, it would seem that the argument advanced that the facility with which such fracture can be repaired, removes the objection which their occurrence offers to the use of this style of work, loses much of its force, and the repairing process itself is comparatively worthless.

The durability and success of this kind of work, evidently depends upon the strength originally given to the gums, rather than upon the facility with which it can be repaired when broken, and unless science and experience shall give to work put up in this manner a greater amount of strength than has ever yet been obtained, the utility of the method is altogether problematical.

Block Teeth.—In no branch of our profession has the march of improvement been more rapid than in the manufacture and insertion of block teeth, and the fact of their general use by the best dentists sufficiently attests the high estimation in which they are almost universally held, and fully justifies the statement that they can be put up in a manner, which for beauty

and utility is superior to any other style, the merits of which has been tested by experience. They are adapted to all cases where teeth with gums are required.

They must be manufactured to suit the particular case in which they are to be used, hence it is important that every dentist should make them for his own use, and if he is not able to carve and mount them himself, he should at least have sufficient knowledge of the art to enable him to superintend and direct others in the operation.

The limits of this article render it impossible for me to give any adequate description of the process gone through in the manufacture of these teeth. I shall, therefore, refrain from any attempt to do so, and proceed to notice the different methods of attaching them to the plates.

That most frequently adopted, and which is by a majority of dentists believed to be the best, consists in securing the blocks to the plate by the use of standards attached to the palatine surface of the blocks, by means of platinum pins put in the blocks before they are biscuited, and soldered to the plate.

The backings may be disconnected the same as when single teeth are used, or form one continuous band on the inner surface of the blocks. A continuous band gives the nicest finish, and it affords less opportunity for the lodgment of extraneous matter than the separate standards, it is probably the better of the two. The beauty and durability of the piece will be greatly enhanced by putting a *rim of gold around their outer surface.*

Another plan which is sometimes employed, is to solder pins on the plate, to correspond to the vertical holes made through the teeth, and the blocks fastened by riveting the pins on the grinding surface of the molars and bicuspids, and on the labial surface of the cuspidati and incisors.

The last method I have to notice is, that of attaching the blocks to the metallic base, by setting them either in gutta percha, or what is better, a cement composed of equal parts of sulphur and fine feldspar upon pins, soldered to the plate, to correspond to the vertical holes in the blocks. The blocks should be accurately fitted to the plate and to each other, and

after the pins have been soldered on a strip of gold, about one-half the thickness of the plate and one-eighth of an inch in width, should be fitted and soldered to the plate, so as to form a continuous band around the base of the blocks. Notwithstanding the discredit into which this plan has fallen, I have no hesitation in expressing the belief, that in all cases where the length of the teeth will admit of the use of pins one-eighth of an inch in length, it is the very best that can be employed.

I am aware, that in this, I am giving expression to an opinion conflicting with that entertained by a large majority of dentists, but the results of my own experience have satisfied me, that the objection urged against teeth mounted in this way, that they do not possess sufficient strength and durability, is entirely groundless. That such has been the experience of many is true, but in a vast majority of cases, the fault was in making, and not in the principle.

Many, and indeed, almost every one who has ever adopted this method, have overlooked the importance of the band around the base of the blocks, either as a support to them, or as a protection to the gutta percha from the action of the fluids of the mouth, and have inserted the teeth without it, and because, in the course of a few months, or even weeks, they had the mortification to see the adhesive property destroyed by chemical action and the teeth come off, a result that scarcely needed experience to teach would be the inevitable consequence of such a practice, they at once abandoned it as inefficient and worthless, whereas, if the band had been used, and the blocks set in a mineral cement, a degree of strength would have been given them quite equal to those mounted with pins and backings. When this method is employed, any springing that may occur in the plate during the process of soldering on the pins and band, can be easily remedied before the teeth are set upon it, by binding the plate with fine wire on the plaster model, and heating it to a red heat while in this position, and thus preserving the original adaptation of the plate to the mouth, but if in soldering on the blocks, the plate should undergo any change in conformation, and its liability to do so is much greater than

in the other case, by reason of the unequal expansion by heat of the porcelain and metal, it is exceedingly difficult to restore it to its original shape, and it not unfrequently happens, that the best directed efforts fail to accomplish it, and a partial or total loss of suction is the consequence. Another important advantage which teeth mounted in this manner has, is the facility with which the loss of one or two of the blocks can be replaced without injury to the remaining block or blocks, as the case may be. In order to this, however, it is necessary that the model on which the original teeth were carved should be preserved.

If the blocks have been soldered on, it is with the utmost difficulty that the backings can be removed without springing the plate, and if that is accomplished, the chances are ten to one that the remaining blocks, especially if they have been long worn in the mouth, will fracture during the process of soldering on the new ones, and thus ruin the whole piece.

Artificial Palates and Obturators.—Mechanical appliances for remedying the defects in the palatine organs, have for a long time been employed, and although they never can completely restore the functions of the natural parts, they may, if properly applied, in many cases be made to subserve so perfectly the purposes of the natural parts as to render the inconvenience attending their loss comparatively trifling.

When the defect to be repaired consists of a simple opening in the hard palate, the plan adopted for its correction is the one recommended by Bourdet, with the improvement by Delabarre of securing the instrument to the teeth by means of clasps. This consists of a gold plate accurately adapted to the vault of the palate sufficiently large to cover the opening with two lateral arms, one on each side, extending outward to the teeth, to which they are clasped. When the lesion involves the soft palate, and the action of the muscles draw the soft parts away from the plate to prevent the passage of fluids up between the plate and palate into the nasal cavity in deglutition, and also to prevent the accumulation of the mucous secretions of the nose in the cavity above the plate, Delabarre recommends that a metallic drum be soldered on the palatine surface of the plate in

such a manner as to nicely fit and completely fill up the opening in the palate. This is a very important improvement, and is absolutely essential to the complete success of the operation in all cases where the velum is implicated, and it may always be employed with decided advantage even when the aperture is confined to the hard palate.

The manner of constructing a plate of this description is very simple. The plate is fitted to the mouth and the clasps to the teeth in a manner as previously described. This done, a wax impression of the hole in the palate is taken, and a plaster of paris cast made, after which a metallic model and counter model is procured, and a gold plate is swaged between the two. After the drum has been accurately adapted to the aperture, it is adjusted on the palatine surface of the plate and soldered to it. It is important that the plate and drum should be nicely fitted to the parts, otherwise it would prove a source of constant irritation, and thus greatly augment the evil which it was designed to remedy.

It occasionally happens that in addition to the plate and drum, art is invoked to supply the loss of a part or the whole of the velum and uvula. For this purpose, a variety of ingenious contrivances have been invented, but, unfortunately, though much permanent advantages has in many instances been derived from the use of artificial substitutes for these parts, none has ever yet been constructed which could perform, to any very considerable extent, their proper functions, or that could be worn without more or less inconvenience to the patient.

The different instruments which have been constructed for supplying these defects are too complicated to admit of a description of them here. They are, however, minutely described by Professor Harris, in his Principles and Practice of Dental Surgery.

ARTICLE IV.

Tenth Annual Meeting of the Mississippi Valley Association of Dental Surgeons.

Society met according to adjournment, in the Ohio College of Dental Surgery, Wednesday Morning, February 22, 1854. President, Dr. C. Bonsal, in the chair.

Present—Drs. Baxter, Goddard, Berry, Taft, Watt, Ulrey, Allen, Taylor.

The examining committee reported the names of the following gentlemen for membership in this society, and recommended their admission, viz. Drs. H. R. Smith, Terra Haute, Ia.; E. Collins, Connersville, Ia.; E. A. Herman, Nashville, Tenn.; and M. DeCamp, Mansfield, Ohio.

On motion, report accepted and ballot had, when each was declared unanimously elected.

On motion, the chair was requested to fill the executive committee.

The members elect being absent, the chair appointed Drs. H. R. Smith, Taft and Ulrey on said committee.

It being called for, the president read the opening address; which, on motion of Dr. Taft, was requested for publication.

On motion, adjourned to meet at 2 P. M.

Afternoon Session.—Present—Drs. Berry, Taft, Watt, Bonsal, Smith, Taylor, Leslie, Goddard, Ulrey, Baxter and Allen, acting members.

On motion of Dr. Goddard, the following gentlemen, who were present were invited to take seats during our sessions: Drs. J. McClure, Carrolton, Mississippi; Wm. A. Pease, Dayton, Ohio; W. J. Castner, Clarksville, Tenn.; W. R. Webster, Richmond, Ia.; B. T. Pleasants, Raymond, Miss.; Henry Olivers, Zanesville, Ohio; Professor J. B. Smith, Cincinnati, Ohio; A. S. Dwyer, Louisville, Ky.; B. N. Freeman, Alle-

ghany; J. Bryson, Somerville, Tenn.; J. H. Wood, Cincinnati, O.; W. A. Cornelius, Covington, Ky.; Jos. Richardson, Cincinnati, Ohio; J. B. Rellenstien, Galveston, Texas; A. L. Brown, Xenia, Ohio; J. N. Vaughen, Hopkinsville, Ky.; W. P. Price, Granada, Miss.; Aaron S. Talbert, Lexington, Ky.; Geo. Evans, Lexington, Ky.; Wm. S. Kendal, Cincinnati, Ohio; S. Wardle, Cincinnati, Ohio; —— Daniels, Cincinnati, Ohio; Wm. M. Hunter, Cincinnati, Ohio; E. G. Darling, Cincinnati, O.; T. L. Hamlin, Cincinnati, Ohio.

President, Dr. Bonsal in the chair.

Minutes read and approved.

Executive committee presented their report, which, on motion, was accepted.

Report of the Executive Committee.

Your executive committee would respectfully submit the following report in regard to the order of business:

I. Report of officers.
II. Report of standing committees.
III. Essays.
IV. Miscellaneous business.

1. Is the operation commonly denominated risodontrophy, one really possessing the character claimed for it; and is it one warranted by the known laws of physiology and pathology?

2. The best method for making atmospheric pressure plates.

3. The experience of the members in the use of asbestos, or any other material, for filling the bottoms of cavities in tender teeth.

4. Is the recent preparation of gold, known as sponge gold, crystal gold, &c., equal, or superior to foil for filling teeth.

5. Is the destruction of exposed nerves preparatory to filling, advisable, if so, the best manner of performing the operation.

6. The best metals for casts.

7. Is block tin admissible for the construction of temporary sets of teeth; if so, what is the best method of working it.

8. Election of officers be the special business for Thursday morning at 11 o'clock.

J. Taft,
H. R. Smith, *Committee.*
J. P. Ulrey,

Under the first item, the examining committee reported the following names, and recommended the gentlemen for membership in the society, viz. Dr. John McClure, Carrolton, Mississippi, and Dr. Wm. A. Pease, Dayton, Ohio.

On motion, report was accepted and a ballot had, when they were declared unanimously elected.

The treasurer presented his report, showing in his hands a balance of $ 186 26.

Drs. Goddard, Berry and Baxter were appointed to audit the same, and report.

Report from committee on dental progress being called for, Dr. Allen, the chairman, stated he had not prepared a report, having forgot that he had been appointed.

The committee appointed at the session of 1853, to receive and examine essays competing for the premium offered at that meeting, reported that no essays had been received by them.

It being moved by Dr. Watts, that the resolutions of last year be re-adopted, on suggestion of Dr. Goddard, they were taken up separately; and, on his motion, the first was amended so as to make the sum $ 100.

On motion of Dr. Leslie, it was further amended, so that the essay reported by the committee as the successful one, shall be printed and circulated among the members of the society, and shall not be issued for *general* circulation, until it shall receive the approval of the society, and further, that the copyright become the property of the society.

The first resolution, as amended, was then adopted.

On motion, second resolution was amended, so as to make the committee five, and elect them by ballot.

As amended, the resolutions read,

1st. "*Resolved*, That this association will award one hundred dollars to the author of the best essay, (not previously pub-

lished,) on dental surgery, *adapted to popular circulation*, to contain not less than fifty nor more than seventy-five pages, duodecimo, the copyright to be the property of the society; said essay to be approved by a committee, and by it to be printed and issued to the members of the society, and receive the approval of the association before it be published for general circulation.

2d. "*Resolved*, That a committee of five be appointed by ballot, to examine the essays presented, and report at next meeting. Essays competing for said award to be forwarded to the chairman of the committee as early as January 1st, 1855."

NOTE.—Authors sending essays under the above resolutions, will accompany them with their full signature and address, which they will enclose in a sealed envelop, which will be opened should the accompanying essay prove the successful one, otherwise it will be returned with the manuscript.

Election of said committee was had, and the following gentlemen appointed: Jas. Taylor, W. H. Goddard, A. Berry, A. M. Leslie and J. Taft.

The examining committee made a further report, presenting the names of Drs. A. S. Talbert, Lexington, Ky.; Geo. W. Evans, Lexington, Ky.; and W. R. Webster, Richmond, Ia., and recommended their admission into this association.

On motion, report accepted and a ballot gone into, when these gentlemen were declared duly elected.

The society proceeded to the consideration of the first item under the head of miscellaneous business, in the report of the executive committee.

After the expression of the views of many members, the further discussion was laid over until Thursday morning.

The auditing committee presented the following:

Your auditing committee would respectfully report, that they have examined the report of your treasurer, and find from his books and papers that he has in his hands the following

Balance from last year, ...	$125 26
Received this session, ...	61 00
	186 26
Credit—paid Janitors, ...	3 00
Balance on hand, ...	$183 26

W. H. Goddard,
A. Berry,
J. W. Baxter,
} *Committee.*

On motion adjourned to $10\frac{1}{2}$, A. M., to-morrow.

Second Day.—Morning Session. The president in the chair.

Minutes of previous meeting read and approved.

The consideration of risodontrophy was resumed, and the discussion continued, after which, on motion, a committee consisting of Drs. Goddard, Taft and Ulrey was appointed to examine forceps presented under the premium resolution of last year.

The special order for 11 o'clock, being the election of officers, the following gentlemen, after balloting, were declared elected:

President, W. H. Goddard, Louisville, Ky.; vice-president, A. Berry, Covington, Ky.; recording secretary, A. M. Leslie, Cincinnati, Ohio; corresponding secretary, George Watt, Xenia, Ohio; treasurer, C. Bonsal, Cincinnati, Ohio.

Examining Committee.—Dr. Jonathan Taft, Xenia, Ohio; H. R. Smith, Terre Haute, Ia.; J. P. Ulrey, Laurenceburgh, Indiana.

Executive Committee.—Drs. W. R. Webster, Richmond, Ia.; A. S. Talbert, Lexington, Ky.; J. W. Baxter, Warsaw, Ky.;

Committee on Dental Progress.—Drs. A. M. Leslie, Cincinnati, Ohio; Geo. Watts, Xenia, Ohio; Wm. A. Pease, Dayton, Ohio.

Dr. Goddard moved the adoption of the following resolution:

Resolved, That the members of the Mississippi Valley Association of Dental Surgeons are extremely gratified, and hail

with pleasure the ensuing meeting of the American Society of Dental Surgeons, to be held in the city of Cincinnati, in August next, and we pledge ourselves to use our best endeavors to greet the brethren of our sister association, and extend them a hearty welcome. We hope a large delegation will be present.

Dr. A. Berry moved the adoption of the following resolution:

Resolved, That the resolutions passed by this society in 1844, in reference to mineral compounds for filling teeth, be hereby rescinded.

After discussion by some of the members, it was, on motion of Dr. Leslie, laid on the table and made the special business at 3 o'clock.

The society took up the subject of atmospheric plates, as suggested by the executive committee.

On motion, the order of business was suspended that the committee on forceps might report.

Report of Committee on Forceps.

Your committee have had presented to them a part of a set of extracting instruments, viz. eighteen pairs of forceps, of every variety of shape, crook and adaptation—but as the resolution of the society calls for a perfect set of extracting instruments, which your committee suppose, includes every instrument required by a dentist to remove teeth, fangs, &c. The set before us being incomplete, we deem it unnecessary to make any further report.

Your committee, in justice to the cutler, Mr. H. R. Sherwood, of Cincinnati, would state that his workmanship (judging from the forceps before them) is unsurpassed by any we have before seen, and would cheerfully recommend him to the favorable consideration of the dental profession.

W. H. Goddard,
J. Taft,
J. P. Ulrey. } *Committee.*

On motion, adjourned to 2, P. M.

Afternoon Session.—Society met according to adjournment. President in the chair.

Minutes of morning session read and approved.

Dr. H. R. Smith, moved, That a committee of three be appointed to report what may be considered as constituting a perfect set of extracting instruments. Lost.

On motion of Dr. Leslie, The resolution of last year, offering a premium on extracting instruments, was amended so as to read,

Resolved, That this association will award fifty dollars or a medal of equal value, on the most perfect set of extracting instruments, the same to receive the approval of the society.

It is understood this is open to all members of the profession as well as manufacturers.

Dr. Bonsal left the chair and conducted Dr. Goddard, the president elect, to the same, who in a few brief remarks tendered his thanks to the society for the honor conferred in again calling him to preside over them.

On motion, *Resolved*, That the thanks of this association be tendered to Dr. Bonsal, for the faithful and impartial manner in which he has presided the past year.

Dr. Pease, moved, That the chair appoint a committee of three, to ascertain the average duration of clasp teeth, and report at session of 1855.

The president appointed Drs. Pease, Watt and McCullom, said committee.

Dr. Watt presented to the attention of the society, an improved screw for extracting stumps of teeth. The screw is separable from the shank, and sits in a square socket. After insertion the handle is removed, and the forceps applied.

The resolution laid over from the morning was next discussed at length, by many members, after which, on his request, the mover had leave to withdraw it.

Moved, That the rules be suspended, and item fourth be next considered. Carried.

On motion, adjourned to meet at 7, P. M.

Evening Session.—Vice-president, Dr. A. Berry, in the chair.

Minutes of afternoon session read and approved.

The subject of "sponge gold, crystal gold," &c., was further discussed by several members, explained at length by Dr. Taft, who spoke of some of the modes of preparing crystal gold, and pledged that so soon as some experiments, he and Dr. Watt are pursuing, are sufficiently progressed, they will describe the processes minutely for the general benefit of the profession.

Under the rules, the third item of "miscellaneous business" was discussed, and the use of asbestos under the fillings, in cases of highly sensitive dentine generally recommended.

On motion of Dr. Leslie,

Resolved, That a committee be appointed to procure the printing of five hundred copies of the Constitution and By-Laws, in pamphlet form, with power to draw on the treasurer for amount of bill.

The chair appointed Drs. Leslie, Taylor and Bonsal.

On motion of Dr. Taft,

Resolved, That the final adjournment to-morrow, be not later than 12 o'clock, M.

Dr. Pease read some tables showing "the comparative periods of decay of the bicuspid and molar teeth at different periods of life in the sexes."*

Adjourned to 8, A. M., to-morrow.

Third Day.—Morning Session.—Minutes read and approved.

On motion of Dr. Taft,

Resolved, That a committee be appointed to conduct microscopic observations, and to report the same to the next meeting.

Dr. Taylor moved, The chair appoint a committee of three on the above.

Chairman appointed Drs. Taft, Taylor and Leslie, said committee.

The fifth item of miscellaneous business was discussed by several members, and the destruction of exposed nerves preparatory to filling, generally approved—especially in incisors and bicuspids. For its destruction, an instrument is preferred

*The tables and explanations will be published.

when the nervous condition of the patient will allow it, otherwise arsenious acid was considered the best chemical agent to be used in its destruction.

Sixth item, viz. "best metal for casts."

An alloy of two or more metals preferred by some members for male casts. Some use tin and zinc, others copper and tin, &c.

Seventh item considered. Dr. Baxter addressed the society on the subject and presented a mode he has pursued, (it being a modification of Hawes',) and presented to the society a full set of gum teeth he had mounted on his plan.

On motion of Dr. H. R. Smith,

Resolved, The thanks of this society be tendered Dr. Baxter, for his specimens and explanation of the mode, and that he be requested to furnish a written description for publication.

On motion of Dr. Leslie,

Resolved, That the By-Laws be amended by the insertion of the following, (taken from the resolutions on record,) as the seventh article: "That any member of this society who shall extol his own peculiar merits over those of a fellow practitioner, or offer his services at lower rates than is common among the members of the profession among whom he operates, through the public prints, or uses any secret nostrum, (unless pledged prior to the present time, 1846, to maintain secrecy,) shall be liable to expulsion from the society."

Dr. Leslie moved, the following be inserted as the eighth article:

"That any member of this society who may patent any instrument or mode of practice, may be subject to expulsion from the society."

This was not passed. Members expressed their satisfaction with the resolution of the committee on patents, which was adopted in 1852, and a request made, that said resolution be printed with the constitution.

On motion of Dr. Leslie, the following was added to the sixth section of article 1st.

The treasurer shall also notify members in arrears two years,

and if not paid by the meeting next succeeding said notice, it shall be his duty to report the same to the society.

The original seventh article was adopted as the ninth.

The following gentlemen were appointed to prepare essays for next year.

Opening address by the president.

Essays.—A. S. Talbert, H. R. Smith, Geo. Watt, J. G. Hamell, J. P. Ulrey and H. McCullom.

The secretary drew the attention of the society to the fact, that it possessed no place suitable for the preservation of the papers, books, specimens, &c. it may come into the possession of, and which it would, no doubt, receive, if the proper means were adopted to form a cabinet. This he thought a favorable opportunity (the College Association being about to rebuild) to secure suitable accommodations.

On motion of Dr. Taft,

Resolved, That a committee of three be appointed to confer with the building committee of the College Association, with power to make such arrangements as may seem best, and draw on the treasurer for the necessary funds.

The chair appointed Drs. Leslie, Bonsal and Taylor, said committee.

On motion, The treasurer was authorized to pay the janitor of O. D. College, $5 for services.

Minutes read and approved.

On motion, Adjourned to meet in the Ohio College of Dental Surgery, Wednesday, 10, A. M., February 23, 1855.

A. M. Leslie, *Secretary.*

ARTICLE V.

A Painful Situation both for Patient and Practitioner, and the Advantage of Presence of Mind to the latter. BY J. L. LEVISON, D. D. S., &c.

MR. H———, a nice old gentleman, about seventy-five years old, applied for my professional services, and I incidentally noticed at that time, that he had strong symptoms of disease of the heart.

Subsequently, having had an accident with his bone lower jaw, he called upon me for another, which he specified must be ready at such an hour, and on a particular day. The promise was made, and punctually to the moment, his carriage drove to my door, and soon my servant showed him into my surgery.

It may be remarked, that he had been a free liver, enjoying life, as it is called, and which in his early days, it is probable, that he would not do what would have been deemed a great disgrace—sherk his bottle; but which now, by a change of custom for better, would have been regarded the better proof of an educated man. He was, however, a very nice, urbane, and cultivated gentleman, about the middle height in stature—with light blue eyes, a florid face, and of a sanguineous temperament; and as he entered, having more closely observed him and his mode of breathing, it was evident that he was affected with *angina pectoris*. After an almost automaton bow of recognition, I pointed to my operating chair, and he sat down without either of us having spoken a word. But as I turned my back to him, in order to open my mahogany work-board, I merely said, "You are very punctual, sir!" when immediately after I heard a curious gurgling sound, and turning round to ascertain what it could be, I saw my patient with his head thrown backwards—his face livid—his eyes fixed, and his lips open and motionless, as if he was either in *articulo mortis*, or

had actually already given up the ghost! My first act was to feel his pulse, but he did not seem to have one, and yet I could not believe him to be dead. I therefore threw open the window, and dashed some cold water in his face, and watched the result with breathless anxiety. Soon, to my great satisfaction, I saw him move. He then opened his eyes with a peculiar stare, like one suddenly recovered from a fit—then he endeavored to speak, but his tongue moved heavily, and there was a thickness and indistinctness in his words, in the manner of one partially apoplectic. Whilst I was perspiring at every pore, he pointed to his mouth, and seemed impatient and somewhat annoyed that I did not proceed. Having tried the fit—which was very good—yet I was so anxious lest he should relapse, that I urged him to call another day, and would willingly have foregone the receipt of the fee to have got him safely out of my house. But the good old man, by gesticulation and his "unknown tongue," seemed to insist on my keeping my bond, so I put in the jaw. It fitted him admirably well. He felt in his pocket, muttered something, then felt again, as if annoyed at his disappointment. Interpreting these actions to the fact that he had forgotten his purse, I said, "never mind the money, sir;" at which he said something which I could not understand. Again his head fell backwards, and his face assumed a darker hue, and again his spirit seemed as if it had departed.

I had recourse to similar treatment, though it appeared a forlorn hope. Still I persevered, and placed some strong ammoniacal salts to his notrils, and after a vast amount of labor and anxiety, he once more, to my great relief, breathed again. And as he recommenced seeking for his purse, I repeated, "Pray, never mind the money, you are very ill, do let me beg of you to return to your residence?" "No! no! no!" said the worthy man—"some paper! some paper!" I gave him paper, under the notion that it would be a means of expediting his departure, and so it did; for he wrote a few hieroglyphical signs for a check, and then I induced him to take my arm, and as quickly as my humanity permitted, I got him safely to the street door, which my boy opened, and all assisted the coach-

man to get the patient into his carriage. He was driven to his temporary home, (as he was a visitor at Brighton,) and died a few hours afterwards, having, however, sent the fee immediately on his return.

What may be called *presence of mind* in this case, might be rendered thus: "That though greatly agitated at the prospect and annoyance of a coroner's inquest at my own residence—these thoughts mocked me, inducing some agitation—at the same time being cognizant of the fact, that unless I could stimulate him by the means used, so as to rouse his brain and excite the heart's action, that there was not the least chance of his recovery; and it was, therefore, the cool and deliberate manner which carried into effect the decision of the intellect, and the firmness of purpose by which I persisted in my operations, (varying the means and their application according to the particular exigency;) it was these combined, (the intellectual powers and firmness,) which constitutes what men designate "*presence of mind!*" and which is easily distinguished from those mere impulsive acts under some difficulty, as much as is the difference of a practitioner acting from sound theoretical views, and one who is merely guided by some empirical treatment. The latter may succeed—the former *must* do so; and therefore, in any unexpected difficulty, the question with myself has ever been—what is this? what has caused it? how shall it be treated? And when satisfied on these points for all practical purposes, I act promptly, and recommend all "to do so likewise."

ARTICLE VI.

Chloroform. Letter from JAMES HARRISON, Dentist, Jamestown.

ENCLOSED I send you, my method of counteracting unfavorable impressions made by chloroform, or the means I use when a person is sinking under the effect of chloroform. I have read a case in the American Journal of Dental Science, page 272, vol. 4. The brain, the centre of the nervous system, should be immediately aroused to action, and the valves of the heart put in motion again. The remedy is this: sicken or nauseate the stomach, mechanically as follows: take a light whole goose quill, run the feather end down the throat of your patient to the larynx, give the quill a rotary motion, or if there is not any thing more convenient, take your finger, run it down the throat, move it round and round the side of the throat, touching or exciting the larynx, and mostly the epiglottis. The quill would be preferable if the jaws are locked, if so, run the feather end of the quill between the teeth or back of them, reaction will immediately take place.

I would as soon think of restoring a person sinking under the effect of chloroform by tickling the sole of the foot as to depend on artificial respiration alone. I am confident that this remedy will be of great use to suffering humanity. May it be fairly tested, and endorsed by all who find it to be of use.

N. B. I never let the pulse fall below 45 to the minute—consider the patient safe, pulse at 50.

[An operation like this was recommended, by Ricord, who believed death to take place in consequence of a closure of the glottis. He thrust his hand down the throat, and lifted the epiglottis, which he always found pressed down upon the upper opening of the larynx. This treatment was highly approved and very generally adopted after its first introduction.—*Eds.*]

ARTICLE VII.

Exostosis. Letter from Dr. S. H. HARVEY, McConnellsburg, Pennsylvania.

ENCLOSED I send you three teeth, which I extracted from the mouth of Mrs. L., of this place. Her health very delicate, slightly disposed to scorbutic, had suffered very much from her teeth, the salivary glands constantly discharging very freely. Mrs. L. had thirteen teeth taken out at one sitting, all of which were more or less effected with exostosis. The three I send you, however, are the most strongly marked. She suffered constant pain, and her health gradually appeared to grow more and more feeble. But from her extreme timidity and dread of the operation, she resisted for a long time, her own good sense, the advice of her family physician and the wish of her husband, to the extraction.

The teeth I send you are the left superior cuspidatus and bicuspids. There was a thin purulent and offensive discharge of pus followed the extraction of the most marked cases. I am happy to add, the health of Mrs. L. has very materially improved, and is still improving since the extraction, and she confidently now believes she again will be restored to her wonted good health.

NOTE.—The senior editor begs to return his thanks to Dr. S. H. Harvey, for the specimens of dental exostosis mentioned in the above letter. He will have them placed with others in the Museum of the Baltimore College of Dental Surgery, where they may be examined by professional gentlemen visiting the institution.

ARTICLE VIII.

Cases of Caries and Exfoliation of the Jaw. By DR. W. A. SHELBY.

Extracts from Letter.

WARWICK, *Feb.* 19, 1854.

MR. J. W. DERR. *Dear Sir*—In compliance with your request, I hereby furnish you with an account of the circumstances attending the case of caries and exfoliation of a portion of the inferior maxilla, as far as memory serves me. Not having taken notes at the time, and a number of years having elapsed, I hope I may be pardoned for not giving the full particulars and minutiæ of the case, as might be expected.

I was summoned to see Miss E., of Elizabeth township, Lancaster county, Pa., on June 1st, 1841. Her age was 19 years; she was of a bilious temperament, and was a tall well built specimen of her sex and age. On inquiring into the history of the case, I learned that she had always enjoyed good health, up to the period of this attack; that some eight weeks previous she became afflicted with an ordinary toothache in the first inferior molar of the right side, and that in the course of a few days an extensive swelling of the corresponding cheek took place, accompanied with high inflammatory action of the general system.

Their usual family physician was called in, who treated her for a period of about seven weeks, with antiphlogistics, alteratives, rubefacients, blisters and discutients, apparently with little benefit, and eventually relinquished the case to its own course, having exhausted the catalogue of remedies.

At this juncture I was called in. She presented a pitiful appearance; her otherwise robust constitution worn down by hectic, inability to take nourishment and loss of sleep; the

swelling of the cheek and part of the neck was enormous, and presented a livid mottled appearance. From her mouth flowed a constant stream of saliva and purulent matter of a very fetid character, which kept up almost constant nausea and frequent vomiting.

On examining the originally painful tooth, with the intention of removing it as the source of mischief, since it was considerably decayed, I found the soft parts around the tooth destroyed by ulceration, and a portion of the alveolar processes exposed around its roots. This is indicated in the specimen at the present day by a brownish yellow tinge.

In an attempt to shake the tooth with my finger and thumb, I found all the teeth moving simultaneously. Satisfied that a section of the bone was detached by caries and imbedded in purulent matter, I at once determined upon its removal, but not having known the nature of the case, until I arrived at the residence of my patient, I found myself unprepared to proceed that day, so I left and returned the next day, June 2d, "armed," to use the language of the late Dr. Harlan, in his remarks on Prof. Wm. Gibson's operation for osteo-sarcomatous tumor of the antrum and superior maxilla, "with horrid crooked knives, gouges, chisels, saws, and even such cruel instruments as red hot pokers," i. e., actual cautery—in short, I prepared myself to meet any emergency with regard to bones and blood vessels. I dreaded, more particularly, the inferior maxillary artery. *A priori*, it was impossible to know in what condition it might be, and a section of it must necessarily be removed with the bone.

I kept my actual cautery in a serviceable condition, and with a small scalpel made a section on each side of the teeth, from the cuspidatus to the last molar. I then grasped the denuded portion of the bone surrounding the roots of the first molar, with a pair of lower molar forceps, and by a vascillating slight traction, brought the entire diseased portion away, with the two bicuspids and two molars in their respective situations. I found much less difficulty in its removal than I had apprehended. There was considerable hæmorrhage at first,

but it soon yielded to cold, astringents, such as tinct. gallæ in water, and acetat. plumbi in solution. These I ordered to be continued four or five times, daily, and after a few small spiculæ of corroded bone discharged, during the first few days, the discharge almost suddenly ceased, the loose flabby gums contracted and approximated, and new granulations of flesh sprouted from the bottom, closing the wound in a remarkably short time. Every other distressing symptom vanished, her stomach regained its tone and tranquillity, and her general system was soon renovated.

During all this improvement of symptoms, I felt deep regret and anxiety for her future appearance, apprehending an awful deformity from collapse of the cheek in accommodating itself to the vacuum thus formed inside. The cheek, as I have already stated, was very much enlarged and indurated, and was very tardy in resolving itself. Even after the removal of the bone and the subsidence of every other unpleasant symptom, it required several months for its gradual resolution, and about the time I was watching for the deformity to take place, I was most happily disappointed by finding that nature had most mysteriously been busy during this time in building a bony bridge across the lower part of the chasm, thereby effectually preventing collapse of the cheek and saving the young lady from a very unpleasant disfiguration, at the same time giving strength, permanency and symmetry to the entire inferior maxilla and ensuring the due performance of its office in mastication.

What became of the duct of Steno and other salivary ducts, I cannot precisely tell, but my impression is, that they must in a great measure have become obliterated and destroyed in common with the inferior maxillary artery and nerve—through inflammation, ulceration and subsequent cicatrization, &c.—but one thing is certain, she did not suffer any subsequent inconvenience from the destruction of parts, with the exception of having her upper grinders rendered useless by the loss of their antagonists below. Her digestive powers were good and her well nourished appearance and rosy cheeks betokened a sound state

of her constitution when I saw her last in the spring of 1845, a short time previous to her removal with her father's family to Fort Wayne, in the state of Indiana, where, I am lately informed by her relations, she is still living in the enjoyment of good health.

Mr. J. E., a first cousin to the young lady whose case I have just stated, a blacksmith by trade, aged about 32 years, called upon me early one October morning, about eight years ago. His appearance was ghastly pale and betokened great suffering; he informed me that he had suffered tooth and jaw-ache, extending into the temporal region and ear, for three successive days and nights unremittingly, that he could neither sleep, eat nor rest any where. The right inferior dens sapientiæ was very far gone by caries and was very sore; the gums slightly inflamed and swollen, so was the external cheek and the parotid and submaxillary glands of the side.

I lanced the gums and removed the tooth with the forceps, but when I examined it, found one fang behind. This was owing to one half of the crown of the tooth having been destroyed by caries down to the separation of the roots—the portion which I removed came out with ease, and in a few minutes my patient was free from pain, became very cheerful and took a hearty breakfast with me, the first meal in three days. As he was now relieved, he concluded to go to the city of Lancaster that day upon a business errand, eight miles distant. The day was rather cool and damp, occasionally raining. Whether he actually got wet I do not recollect, but at all events, it was an imprudent exposure under the circumstances, and on the following night the pains recurred—he summoned me to call on him and bring something to destroy the nerve in the remaining fang. I attempted its removal but owing to its depth and the swelling and sensibility of the soft parts, I soon gave up the idea and resorted to blood-letting, blistering, purgatives, diaphoretics, alteratives and anodynes, all in their turn. The pain and swelling gradually increased instead of diminishing, and the swelling eventually extended up to the vertex and towards the occiput. Only temporary relief was afforded occasionally by

the administration of morphia and camphor. The case proved so obstinate and the suffering so great that one physician after the other was called into consultation until we numbered four, amongst whom I would mention the names of my friends, Dr. John L. Atlee, of Lancaster city, and Dr. Isaac Winters, of Hinkletown, Lancaster co., two experienced and accomplished physicians as are to be found any where—but all our united efforts were in vain; our patient soon became phrenzied from meningeal congestion, and before we could give vent to any deep-seated collections of matter which we suspected under the temporal fascia, he died, after suffering about three weeks. No autopsy was allowed.

ARTICLE IX.

Improvement in Suction Plates. By CHARLES H. DUBS, Dental Surgeon.

THE value of this improvement consists in effecting an equal or superior force of atmospheric pressure and adhesion of the metal, and with or without the central cavity. It leaves the palatal organ entirely unrestrained and uncovered by the metallic plate, burdens the mouth with less weight of metal, and depends for its power of adhesion by atmospheric pressure entirely upon the deepening of the rugæ, particularly those in or near the crown of the dental arch.

To effect this, in the first place, I take two exact impressions of the mouth, and if there is any choice between them, reserve the best impression for the second cast, or dies.

Secondly, I make my model in sand, cast the dies, stamp the plates well, then take the reserved wax impression, and carefully cut out and deepen the lines of all the rugæ or undulations that are visible, in depth about three times the thickness of a sheet of foolscap paper. I then run my plaster as usual,

and before the plate is completely struck up, I planish out the palatine edge of the plate and proceed to stamp; but, previously, I cut a thin piece of copper plate, as thick as a half dime, and in width one-eighth of an inch, formed to follow the entire palatine edge of the plate, stamp it up in the first dies, trim to suit exactly the edge of the plate and then stamp as usual, retaining the copper plate between the lower palatine surface of the metallic plate and the antagonizing dies, and when the plate is complete I set the teeth and finish.

In cutting deeper all concave parts of the plate, or the lines of rugæ or undulations of the mouth, I am very particular to preserve the natural form and relative proportions of the same. A plate made on this principle does not require a width of more than half or five-eighths of an inch from the back part of the lining of the incisor teeth to the palatine edge of the plate.

If a central cavity is desired, I take a piece of copper or annealed brass plate, the thickness of a dime, cut it in an oval crescent form, one inch in length by half an inch in width, more or less, according to the size of the mouth. Placing the same between the two first dies, I stamp its form. At the time of its being struck up, the piece of copper or brass plate should be larger than needed, and afterwards trimmed to the suitable size with the edges square. With this mode of obtaining the central cavity, it is very neat when finished, and corresponds exactly to the deepened rugæ of the mouth. To get the depression for the central cavity, after being struck up, I cast on my last die, by placing the copper or brass plate on the male cast, which has received a faint impression, although sufficient to hold it in the exact position required. Then placing my zinc male model ready to receive the female die, I hold the cavity plate down steadily with a slender piece of iron wire, which can be withdrawn before cooling; I then stamp the plate over, for the last time, with the cavity plate and also with the narrow copper plate that has already been used to keep the palatine edge of the plate for the mouth tight and flat to its approximate surface. When the central cavity is desired, the plate should be three-eighths of an inch, or more, wider than when no other force than

the deepening of the rugæ is required. Both of these plans I have used in my dental practice, the one for nine and the other for six years, and I must express it as my candid opinion that those plates depending for adhesion alone upon the deepened rugæ are as good, or better, for the majority of mouths as those with the central cavities. In the former, every deepened rugæ has the power of the cavity, prevents the plate, while in the mouth, from being forced down, and brings the bearing and pressure of the plate to a firm rest upon the concave part of the arch of the mouth, capable, by its structure of bone and cartillage, thus leaving the soft, pulpy and fleshy part of the convex of the mouth, entirely at ease, free from constraint, pressure and irritation.

I can truly say, that in my practice, I never, on this principle, had a case attended with the least irritation, but all have given entire satisfaction.

Natchez, July 17th, 1854.

ARTICLE X.

Improved Sets of Artificial Teeth. By MAHLON LOOMIS, Cambridgeport, Mass.

MESSRS. EDITORS.—I have made an improvement in sets of artificial teeth which must revolutionize, to a great extent, that kind of business, and will be of much interest to every dentist, as well as to the community generally.

It is an improvement which I have just patented in this country, Great Britain and France, and consists chiefly in making whole or half sets of artificial teeth all of porcelain, without the use of any metallic plate, and a half set to consist of but one piece of material.

Many advantages arising from this, immediately suggest

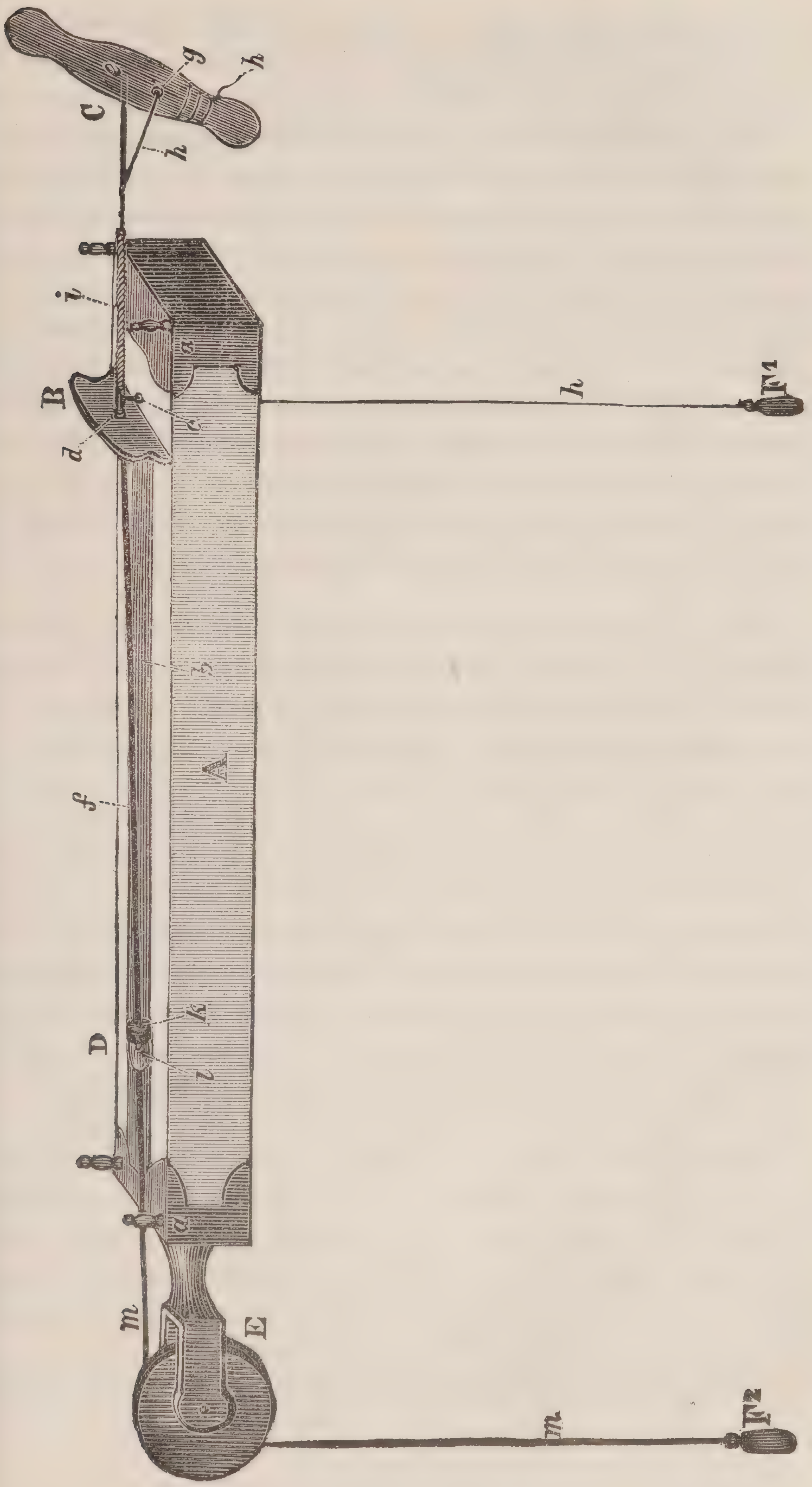
themselves. In the first place, a set made in this way will be a *neater* or more perfect manufacture than can be made in any other way; they cannot become impure—even with the utmost negligence they will keep themselves perfectly clean. Again, the expense of making them in this way is so comparatively small, that they may be afforded at a greater profit, at one half the price of sets made in the usual way. The labor and time required for making a set of teeth in this way is incomparably less, and dispenses at once with a multiplicity of tedious operations. I have fitted the most difficult gums with all the ordinary ease and accuracy, and several sets which I have made of this style have now been in use a year, answering every requirement, besides possessing many other self evident advantages.

I know from experience, that no dentist will ever go back to other methods after he has once made use of this. And *no* person who wears artificial teeth will ever wear any others when they have tried or seen these; for they have but to be seen and they evince their own superiority. That this way of making sets of teeth has long since been thought of, there is little doubt, but its practical availability is now made manifest.

ARTICLE XI.

Description of a New Apparatus for Making Spiral Springs for Double Sets of Artificial Teeth. By C. N. L. SCHMEDICKE, Practical Dentist, &c., in Berlin, Prussia.

IN the following article, I take the liberty of laying before the respected readers of this journal, a new apparatus for making spiral springs for artificial teeth, which I have employed for some time with the best results, and which seems to me not unworthy a more extended use.


C
B
D
E
A
f
h
m
F^1
F^2

The apparatus consists of a wooden basis A, from 6 to 9 inches long, 1 inch broad, and $\frac{3}{4}$ of an inch thick. (The latter dimension appears larger in the cut, because the upper surface, to be clearly exhibited, could not well be drawn in proper proportion.) This basis, which is provided at both ends with metallic cups, *a a*, serves as a direct security to the upper portions of the apparatus, and is fixed between the jaws of a vice. On the upper surface it is hollowed its whole length, in a roundish gutter, *b*, in which the movable parts of the apparatus plays to and fro. About half an inch from one end of the basis, on the upper side, is placed perpendicularly a metallic slide, B. Just before that face which looks toward the nearest end of the basis, the latter is perforated from above downwards, *c*. In the centre of the slide also is an opening, *d*, just large enough to allow the movable portion, which goes through it, to turn round easily.

The movable portion of the apparatus, *c*, is composed of a handle, *e*, and a steel wire or bar, firmly attached to it at a right angle, the thickness of which corresponds with the diameter of the desired spiral spring. The handle is provided with a hole, *g*, through which passes the end of the gold wire, *h h h*, out of which the spiral spring, *i*, is to be made. The before mentioned bar, which extends the whole length of the metallic slide, lies with its free end in a regulator so as indeed to fix the latter, but to offer no obstruction to the rotation of the bar when this is set in motion. This regulator, (Vorrichtung,) D, consists of a cylindrical holder, playing in the gutter of the basis and provided with a metallic bow. This holder is pierced longitudinally to receive the end of the rod which is provided with a screw thread, on which is fitted a nut, *l*. To the metallic bow is attached a piece of cat-gut, *m m*, which, by means of a weight, F 2, on its other end, balancing the counterpoise, F 1, fastened to the hanging end of the gold wire, exerts traction upon the holder and through it upon the bar. In order to ensure the greatest possible mobility, the cat-gut passes over a pulley which is attached to the corresponding end of the apparatus.

When a spiral spring is to be made by this arrangement,

the basis is securely fastened in a vice; one end of the gold wire is drawn through the hole, *g*, in the handle, and the other end is allowed to hang through the perpendicular opening, *c*. To this hanging end of the wire is attached a weight, F 1, and another, F 2, is made fast to the end of the cat-gut which runs over the pulley. When the movable part of the apparatus, the bar, is drawn by the operator towards himself, by means of the handle, the gold wire forms itself into spiral coils upon the bar. In this manner can be made a continuous spiral spring of great length, which can afterwards be divided in pieces to suit any particular set. When the gold wire is all worked up, the weights, F 1, F 2, are taken off, the nut, *l*, removed from the free end of the bar, which is then drawn out of the holder and the slide. The end of the gold wire, which was fastened to the handle, is thus cut off and the bar drawn out of the finished spring.

The spiral springs made by the aid of this apparatus, exhibit not only a high degree of elasticity, but also a great evenness in the coils; advantages which are due to the double traction of the weights and the equality of their motion. While the spiral coils of the gold wire are forming on the rod in consequence of the motion of the handle, they are drawn so strongly against the slide by the traction of the weight, F 2, that they are pressed against one another with the greatest closeness. On the other hand, the opposite traction of the weight, F 1, attached to the free end of the gold wire, which balances the other with mathematical accuracy, secures a uniformity in the single turns which leaves nothing to be desired. To these peculiarities the apparatus owes its utility.

REVIEW DEPARTMENT.

ARTICLE XII.

Homœopathy, its Tenets and Tendencies—Theoretical, Theological and Therapeutical. By JAMES Y. SIMPSON, M. D., F. R. S. E., Professor of Midwifery in the University of Edinburg, &c. &c. First American from the third Edinburg edition. Philadelphia. Lindsay & Blakiston, 1854.

Homœopathy fairly Represented; a Reply to Professor Simpson's "Homœopathy" Misrepresented. By WILLIM HENDERSON, M. D., Professor of General Pathology in the University of Edinburgh. First American from the last Edinburgh edition. Philadelphia. Lindsay & Blakiston.

ABOUT homœopathy, as a medical system, there can be no serious controversy. It has no more necessary connection with the healing art than spiritual rappings with rational theology. The basis of medicine is common sense; the superstructure is observation and experience. Homœopathy has no fixed basis, unless it be want of common sense. Its superstructure is the negative of observation and the contradiction of experience. It is extremely difficult to express in positive language the negative ideas involved in the philosophy of homœopathy. Coleridge would have resorted to the mathematical signs, and by a free use of minuses and cyphers endeavored to convey some picture, if not notion, of the results of an indeterminate analysis of nothing. We leave this process to such of our readers as have a taste for transcendental calculations. We are too practically inclined for the sublimities or profundities of impossible

metaphysics. If even a modicum of truth were extortable out of this interminable platitude and fog, we would courageously essay to discover it. But "fleas are not lobsters," and no boiling can redden the nimble parasite into the hues of the simmering crustacean.

Peter Pindar has recorded in heroic verse, the vexations of the great naturalist who lost his temper over the pot of inconvertible insects. We have no wish to exhaust ours in an attempt to get bones out of syllabub or something out of homœopathy.

Nevertheless, homœopathy, if impracticable as a theory, is not worthless as a thing. Though a discussion of its philosophy is but an excursion into the realms of boundless absurdity, its practical recommendations and the conduct displayed under them, are subjects for curious contemplation, and will reward inquiry with amusement, if not with instruction. Of intellectual entertainment, indeed it furnishes great variety, from the mere pleasure of thought to the complex psycho-physical enjoyment of positive fun.

The thing, upon the whole, is wonderfully odd. An elderly lady of our acquaintance, somewhat prone to exuberant adornation of a rather hypermatured person, once appeared in public surmounted by an extraordinary erection of gauze and ribbon, called a turban. A gentleman, very remarkable for imitative ingenuity and constructive skill, after contemplating the magnificent head dress with great interest, observed, "I don't think I could make such a thing. I don't think any body could; but if one should take the materials to a third story window and throw them out, they *might come so.*"

Somewhat of the same kind are our thoughts of homœopathy. Looking at the thing, we don't see how any body could make it. We are sure that no body could do it again. Yet we can conceive that the loose, wild, reckless conceits of a lienteric mind, thrown off without judgment or design, might "come so." That the whole heterogeneous mass of materials, facts and fancies—gauze and ribbon—might take the form of a huge and flashy conglomeration, in which light weight of truth, spun

out to cob-web tenuity, might be alligated with fancies and spangled with glittering fallacies, the whole bearing the name of homœopathy, or any other designation which generatoric humbug might elect to bestow upon it.

The most unaccountable thing is, that men should fall down and worship such a creation as a perfect gift of God. The most unaccountable, but by no means the strangest thing, for men have always manifested a tendency to worship monstrosities; a curious propensity to wonder after stupid contrivances. To many men there seems no utterance so fascinating as the braying of an ass, provided it be delivered with sufficient positiveness and energy.

He who sets a trap for men must not be too nice about it. Any refinement of artifice may beget suspicion: at least it is labor thrown away. There is no necessity for ingenuity or skill. There needs nothing but novelty in the proposition, and impudence in the proposer. The former may be more or less absurd—the more so the better; but of the latter, there can be no degrees. The impudence must be perfect. There must be no sensibility to shame: no consciousness of the feeling of a lie, whether the assurance be based upon erroneous conviction of truth or upon a deliberate resolution to be false, it does not matter; but one thing is necessary—that one thing is impudence. With a face hard enough to look shame out of countenance, a man is armed with a power to which numbers will succumb without resistance.

He who would learn what can be done by mere hardihood of assertion, must study the doings of Joseph Smith and Hahneman; of knee-knockers and table-spinners, and ghost-editors, writing bad philosophy in worse English; burying common sense and common decency under the dishonored fragments of mutilated speech.

The Samaritans were not the only people obnoxious to the charge of worshiping they knew not what. The eminence of the homœopaths, however, in perverse credulity, is, that while formerly the extreme of folly led men, like the Athenians, to raise a temple to a god of whom they knew nothing, the ho-

mœopaths raise theirs to one whom they know to be nothing. They do not merely act without reason, but directly against it. They undertake to make a negative, intensely positive; to bring nothing into the field against every thing; to compound it, swallow it, trace the consequences and register the deeds of it. Nay, they profess to dilute it, nothing, into inconceivable nothingness, and then, out of the nonentity of annihilation, infinitesimally annihilated, to educe potencies before which powers are powerless. *Splendide mendax!* Magnificent humbug!

Should a man advertise to extract sunbeams from cucumbers, he would be a fool. He would deal in the palpably absurd: in the little go "of humbug." A genius carries absurdity into the impalpable regions; pushes humbug to the centesimal dilutions; brings down a fog out of the immensities, and picks pockets in the darkness he has filibustered from chaos.

Will men ever tire of playing at the game of fox and geese?

The two books under review are component parts of a quarrel and controversy between two of the medical professors of the University of Edinburgh, Drs. Simpson and Henderson, the latter of whom, for reasons best known to himself, has become a champion of the delectable system of mystic medicine, called homœopathy, and yet, most disgracefully to the governors of the school, clings to his professorship. Dr. Simpson's book cannot be considered a systematic investigation of homœopathy. Such a thing is an impossibility. One might as well investigate a fog from the German ocean. Dr. Simpson only publishes some reflections upon various theoretical and practical points in the "system," but these reflections are pertinent and shrewd. They expose the charlatanry of Hahneman and his disciples with boldness and skill, and though the author cannot hope to cure a homœopathist of his folly by any force of logic, seeing that to be a homœopathist is to ignore logic as a legitimate route to truth, nor to shame him out of it by exposing the absurdity of the doctrine and practice, since to the homœopath absurdity is a recommendation, yet the book will do good by affording to the uninfected, yet unguarded, of the community, some true notion of the physical and theological principles of

49*

the *soi disant* medical philosophers. It will also afford amusement to the *Democriti* who can laugh at human folly, for surely it never presented itself under funnier aspect, than in the exhibition of a grave, learned, wig'd professor of medicine, putting into the mouth of a grown up man, for the cure of his disorders, a sugar plum of the size of a mustard seed, *medicated* by a drop of a solution of metallic oxyd, taken recently from the Red sea, in which one of Pharoah's shoe buckles was introduced some thousands of years ago, or by some equivalent potency.

We have not time to notice in detail the several subjects introduced by Prof. Simpson. To do so, indeed, would make it necessary to write a book as large as his own, for his statements are made with great conciseness.

Of the theological presumptions of Hahneman and his disciples, Dr. Simpson gives some curious, and to many, novel information.

Men who feel unable to sustain their pretensions to dictate to others, by convincing their understanding, are very prone to appeal to their faith. Hahneman spoke of his discovery, as he called it, as an interference of the "Creator and Preserver of mankind." His disciples speak of him as a "messenger from heaven," "the new evangelist," as "the most inspired of discoverers." We are told that through him "christian science became universal, and redemption descended from the dominion of sentiment to that of the ideas and of intelligence." "Homœopathy is not a science merely, but also, for those who comprehend it, a sublime devotion, a form of religion, a rainbow of divine union, holding out to mankind the promise of speedy regeneration."

We do not profess to be able to interpret the above theological dogmas into comprehensible English. Of thus much, however, we are assured, that if the blessings of this new revelation are restricted to those who "*comprehend homœopathy*," they will be far from "universal" in their diffusion. As to the practical application of the spiritual regenerative force embodied in homœopathy, we should certainly have been at utter

loss but for an English expositor, a reverend gentleman, who being more familiar we may hope with the spiritual than the carnal department of the heavenly science, has zealously opened to us the new revelation of the modus operandi of redemption. This gentlemen is Rev. Mr. Everest, rector of Wickwar, who, in a sermon preached in aid of a Hahnemanic hospital, takes occasion to open the new gospel to the world.

Mr. Everest thinks, that considering the physical and moral blessings comprised in homœopathy, it is hardly to be supposed that the Holy Scriptures can be silent about it, and upon examination he sees, sure enough, as any body may see, that a great fundamental dogma of Hahneman is clearly set forth there, and given an application vastly more extensive and sublime.

This great discovery of Hahneman was that chronic disorders, in which are included proclivity to disease as well as diseases themselves, are all caused by *psora*, or the principle of cutaneous eruptions; the itch infection, he seems to have had particularly in view. The list of maladies he ascribes to this cause is long and horrible, including mania, melancholia, epilepsy, convulsions, softening of bones, cancer, jaundice, gout and hæmorrhoids, deafness and blindness, bleedings and barrenness, &c., &c., too tedious to mention. So much for the carnal consequences of Adam's itch. Itch *eruptive.*

Now for the spiritual consequences. Itch *corruptive.*

Mr. Everest finds the clue to spiritual psora in the moral meaning of ancient leprosy, the type of sin, and in the miraculous cures thereof by our Lord and his disciples. He assumes that the principle of psora is, in its workings upon the human frame, productive of mental and moral effects so complicated with the proper spiritual corruption that God only can distinguish them. Of course to man then they are confounded, and present themselves as identical, and as such they evidently presented themselves to the spiritual discernment of Rev. Mr. Everest. He continues the list of psoraic consequences as prepared by Hahneman, by adding "dark passions, furious lusts, stubborn obstinacies, scowling tempers, gloomy revenges,

jealousies, fretfulness, ill humor, and reluctance to bear patiently the burdens which the Lord lays on man." "The tendency to disorder of the functions aggravates the tendency to sin. The chronic taint in the constitution increases the chronic proneness to sin, which Adam left us. The physical leprosy of the flesh unites with the moral leprosy of the soul. It is this combination of the two, aided often by stimuli, and almost always by large doses of violent inappropriate medicines antecedently given, which festers in your jails, rots in your hulks, seethes in your lanes and alleys, and bubbles up in crime, madness and eccentricity all over your land. This it is which makes your atheist on the one hand, your bigot on the other." "Irreligion is the daughter of internal disorder or disease," and hence he argues that the old system of medicine '*was of no use or value as an aid to conversion.*' But under homœopathic treatment, the itch being expelled, Mr. Everest predicts that "the holy and saving truths of the gospel will be admitted into the heart and *never fail then* to influence the life."

These doctrines are not the peculiar deductions of Rev. Mr. Everest. They are approved and endorsed by "various noblemen, gentlemen and homœopathic physicians," and the sermon was declared with much other commendation, by the editor of the Homœopathic Times, to be "a great achievement." And so it was. Who before Mr. Everest ever had any clear conception of original sin. Who before, among all the acute theologians who wore out their powers upon this perplexing subject, ever caught a glimpse of the sublime and simple truth, that Satan is a great acarus, which having laid in the souls and skins of men the prolific eggs of itch and sin, is now undergoing appropriate destruction in a lake of brimstone! Who again of preachers, ancient or modern, before Mr. Everest, perceived the true obstacle to man's conversion? Did Moses know that Pharoah's heart was hardened by the "itch of Egypt," making him "reluctant to bear patiently the burden which the Lord laid on him?" Did Jeremiah ever dream that the "obstinacy" of the Jews would have given way to sulphur ointment, or that in default of submission he might medicate them to a state of

moral docility by a grain of the antidote thrown into the aqueduct of Jerusalem? Who before Mr. Everest had any correct notion of training up a child in the way he should go? How much anxiety, and patience, and lining and precepting will be saved by physicing sin out of the hearts of the rising generation? This, however, without probably any clear idea of the refined and beautiful philosophy of the thing, was practically enforced by Mrs. Squeers, of Dotheboy's Hall, who gave the boys brimstone and treacle before breakfast to purify their blood and prevent carnal appetite! What an affecting exhibition it would be to see the Rev. Mr. Everest at work purifying his congregation. The Sunday services opened by a short exposition of the moral and corporeal invasion of psora. The symptoms of its presence enumerated. Antidote pellets served by the deacons. The Sunday school children, each supplied from the "school spoon" with the preparation of piety—the Rev. Mr. Everest himself, swallowing a potency, as a preservative from the evil influence, and then, all being effectually brimstoned; all obstinacy and ill humor, and folly and impatience of control, being removed, pouring the undiluted truth of Christianity into willing hearts. And then see the beautiful workings of the "similia similibus," to escape the infernal pit by antidotal brimstone! To consume out sin by an infinitesimal application of its ultimate and infinite consequence. To commute the wrath to come into a pellet to swallow! Sin is itch, and the devil is "Old Scratch." Regeneration is the effect of physic—virtue is but health of body. Spiritual christianity is a fiction; its sublime and glorious truths, its soul inspiring revelations, are, correctly understood, only medical expositions of a special and hitherto unmentionable malady. The *Bible is a treatise on cutaneous eruptions!* Similia similibus! is the Shibboleth of salvation—original sin may be counteracted by actual transgression, or by infinitesimal sulphur!

We have long been familiar with the dreadful dilapidation of the human soul. The history of our race furnishes but too many melancholy instances of the stupidity and folly of the moral nature of man; its insensibility to the glorious spirituali-

ty in the midst of which it dwells, its blindness to the beautiful, its deafness to the true, its incorrigibility to wisdom, its greediness for pravity, its wonderful affinity for lies; but Mr. Everest and his homœopathic friends have uncovered a deeper depth in moral degradation than we had before had knowledge of. That men, educated in our language, and familiar with its literature: professing christianity and even to be teachers of it: that such men should form and promulge such a scheme of moral life and action as this theory of sin by itch and salvation by sulphur: that there could be men willing to commute the glorious religion of Jesus into such a disgusting conceit as this—was certainly beyond all our previous knowledge or imagination of human capability.

We would recommend to Mr. Everest, as a text, the 3d and 4th verses of the 4th chapter of 2nd Timothy, which in our allopathic version, reads thus: "*For the time will come when they will not endure sound doctrine: but after their own lusts shall they keep to themselves teachers having itching ears: and they shall turn away their ears from the truth and shall be turned unto fables.*"

Though we can charitably believe that Rev. Mr. Everest may be fool enough to place some degree of faith in his own theory: we are far from believing such to be the case with many of the homœopathic practitioners who have had the advantage of medical education, and have in former times given evidence of the possession of at least ordinary intelligence. We may pity the teachers with itching ears, but we must denounce and contemn the doctors with itching palms. The man who essays to extract itch from the soul, certainly wants sense, but not necessarily benevolence and honesty; but well informed men who study to extract unrequited coin from the pockets of the ignorant by such pseudo-medical thimble-rig as homœopathy, cannot shelter their knavery behind the plea of imbecility. They have their reward. They get fees. They ride in carriages. They buy houses. Out of a shadow they derive substance. They who crept, can strut. Who tapped humbly at the door of the cottage, may thunder imperiously at the portal of the palace. Who

fretted in solitary places over the neglect of merit, may be astonished at the gainful notoriety of bold and impudent confession of inscience. No wonder that the steps of the honest well nigh slip, when they see the prosperity of the quack, that they are envious of the foolish, who are not in trouble as other men, nor plagued like other men: whose eyes stand out with fatness: who have more than heart could wish! But let them beware that they do not yield to the temptation to go and do likewise. Under all this gratified covetousness and vanity, amidst all the gratulation over obscurity escaped, and duns silenced, and tables supplied, and property gathered, there must be a conciousness of degradation outlasting even the conscience of sin: vanity stung by the contempt of the wise rather than gratified by the homage of the foolish: a sense of loss of caste not compensated by the finding of money. Even after the homœopath of this class has succeeded in the imperative task of justifying his conduct to himself: after he has managed so far to turn his brain upside down as to empty it of the elementary knowledge of his profession, and of the expensive moral precepts which sometimes entangle the opinions of the doctor, long after they have died out of the heart of the man: after he has stultified himself by daily stultification of others, until a comfortable equilibrium of folly is established between him and his victims; after all, the vanity which has grown exuberantly in all this ruin, preserves in the man a sensibility which twinges terribly under contempt, and renders the soul susceptible to pain long after it has lost the capacity of healthy reaction and reform.

One of the most curious parts of Dr. Simpson's book, is that which undertakes to give some mathematical notion of the real quantitative value of homœopathic medicines. The calculations seem to have been made with care, and have been submitted to the examination of professional mathematicians who pronounced them correct. This is a subject which the homœopaths carefully keep out of the view of the public, yet the whole gist of the matter is just here. The homœopath has absolutely no reason for his system, except the experience of the operation of

what he facetiously calls his *medicines*. It is, therefore, all important to know what these medicines are. It matters not how loudly he may assert the potency of his means, if they are found to be absolutely and necessarily and beyond all possibility of doubt, inert. If a man or a hundred men should combine to administer powerful doses of moonshine and water, and if they should record cases of recovery under this treatment, as doubtless they might do, it would be impossible to convince reasonable men that the moonshine was the curative potency. It would be in vain for the moonopath to urge that we could know nothing of the medical virtue of swallowed moonshine except by experience. Common sense would say you must first of all prove that you really administered moonshine; and then that the consequences claimed for it, might not have resulted without it.

The homœopath must, in like manner prove, first that he gives medicine at all, and next, that the given medicine produces the effects consequent.

Now we do not hesitate to say, that the homœopath who gives homœopathic preparations, actually gives nothing more than the vehicle assumed to convey the potency. There is a philosophical sense in which this assertion may appear as a mere matter of verbal criticism to be, perhaps, doubtful. We believe it is strictly true in a proportion of experiments so vastly great as to amount almost to universal fact.

Homœopathic dilutions are prepared upon the principle, that matter is not only infinitely divisible, of which there is no proof, and can be none, but that substances soluble in water are infinitely so, and that those capable of mixture with sugar, can never be so intimately mixed as to be incapable of more intimate mixture, by ordinary processes. That is, that the particles of one and the other can never be reduced to such tenuity as not to be made to penetrate and separate each other under the ordinary mechanical attrition of the pestle and mortar. To make the matter more clear, the homœopathic principle being true, a grain of sugar thrown into the ocean, would be so divided that every drop of water in the ocean would hold some

of it in solution, and that this would be the case were the ocean a million of million times greater than it is. Again, to believe in the presence of an infinitesimal quantity of physic in a homœopathic globule, one must admit that a grain of sulphur could be rubbed up with a globe of sugar, vastly greater than this earth and that every grain of the mass would be impregnated with brimstone.

We must believe as the first step towards homœopathic faith: afterwards will come the more monstrous proposition that a grain of any substance thus divided endows every grain of the immeasurable mass with medicinal potency! No man ever did or ever can believe this absurdity. Insanity itself cannot degrade the understanding to accept it. Those who honestly profess to believe, only cannot comprehend the meaning of what they profess to believe. It is impossible to force reason beyond the limits of physical possibility; once there, she must shrink from investigation or owning her helplessness, lean upon God and assume the name and character of *faith.* Such faith in homœopathy can only be warranted by Divine revelation. Destitute of this, it presents itself a baseless, senseless, impudent presumption, which can only be tolerated in proportion that it is not understood.

To the homœopath who asserts that there is any fragment of medicine in his infinitesimal preparations, we say *prove it.* Prove that your triturating and shaking has diffused your solitary drop or grain through those immeasurable proportions of sugar, or alcohol, or water. Prove that it has not been precipitated, exhaled, chemically combined; or that it has not reached a point in tenuity which cannot be effected by your mechanical force; not presenting volume enough to be compressed between pestle and mortar; not offering resistance enough to be penetrated by a particle of sugar infinitely greater than itself.

The chances are infinitely great that some such bar to unlimited diffusion has occurred, even if there be no point in the division of matter when the repulsive power of an atom is greater than aggressive force, or where the attraction of cohesion can no longer be overcome by any mechanical power, much

less by such gross applications as a pestle millions of millions of times greater than the particle to be rubbed by it, against the sides of a mortar, the most polished sides of which would offer openings, which, compared to a decilionth exiguity, would be mammoth caves. We are warranted, therefore, in at least assuming the negative, that any particular homœopathic pill contains the infinitesimal medicament asserted, and they who assert the fact must *prove it.* We deny that they administer medicine. Let them show the contrary.

Hahneman asserts, that if a desponding and suicidal patient will smell merely a *quintillionth* of a grain of gold, he will be restored within an hour to peace of mind and love of life. Dr. Simpson shows that a grain of gold would be reduced to a quintillionth only by mixing it with a mass equal to sixty-one globes the size of this earth. But Hahneman used much "higher potencies" than quintillionths or fifteenth dilutions. The decilionth or thirtieth dilution was the favorite one. To reduce, says Dr. Simpson, a grain of gold to this decilionth or thirtieth dilution, would require the single grain to be mixed perfectly with a globe of sugar represented by sixty-one quintillions of spheres of sugar, each of these 61,000,000,000,000,000,000,000,000,000,000, being as large as this earth!

Surely it is not worth while to pursue these calculations further! Absurdity, utter, unspeakable absurdity like this, has no comparative degree. The man who can believe that a pill is medicated which he supposes to contain a proportion of medicine to its size, as small as a grain, if it would bear to 61,000,000,000,000,000,000,000,000,000,000 earths, could believe it as well if the proportion were indicated by 60,000 ciphers.

Following out the arithmetical exposition, Dr. Simpson shows that the pill, moistened with the thirtieth dilution, which Hahneman asserts to be indubitably the best dose, consists of a minute globule of sugar, simply dipped in a drop out of an ocean of fluid one hundred and forty billions of times as large as the whole planetary system, and which enormous ocean has been medicated for the purposes of homœopathy by having dissolved and mixed through it one single grain of the appropriate drug.

Such nonsense out-bedlams bedlam. Dr. Henderson does not deny the accuracy of these calculations, but says he knew nothing of the powers of *medicine but by experience.* But what has medicine to do with this matter? Experience of medicine supposes experiment with medicine; experiment with medicine requires the existence and presence, and applicability of medicine. Where is the medicine? In the dried surface of a little pill, once dipped in a solution in which the supposed medicament exists in the proportion of a drop of water in a hundred millions of oceans, each large enough to drown the universe? Do you tell us, that in spite of all reason and common sense, there is medicine in that? Then prove it.

Of Dr. Henderson's reply to Dr. Simpson we have little more to say than that it is no reply at all. It is a poor attempt to divert the attention of the public from the real questions at issue. A large part of it is taken up with the biography and laudation of Hahneman; a considerable part more in sneers and slurs at medicine under the nickname of allopathy and as little as possible upon homœopathy itself. No one from reading the title could guess the character of the book. It is a perfect "lucus a non lucendo;" a title which informs us what the book is not. It is worthy of about as much consideration as is commonly given to the response of the convicted criminal to the rather impertinent inquiry of the judge as to his objections to being hanged. Of course he has objections, but they are not to be supposed to be reasons, nor are they expected to work change in the verdict of the jury or the purpose of the judge. They may be some relief to the culprit, and some comfort to his friends. The last words of Dr. Henderson, have given vent to some bitterness, and may in some way convey, though we do not perceive how, a cordial to his friends. The quantum, if so, is certainly homœopathic.

BIOGRAPHICAL DEPARTMENT.

ARTICLE XIII.

Biographical Notice of the late Josiah Foster Flagg, M. D., Dentist, of Boston.

Dr. Josiah Foster Flagg was born in Boston, January 11th, 1789. His father, Dr. Josiah Flagg, was long known as the "Boston dentist," as he was almost the only person who confined his whole attention to the profession—dentistry being at that time in its infancy.

Dr. F. was the eldest of the family. He received but an indifferent early education, but improved his few advantages so well, as to be prepared to enter as a student of medicine under the tutelage of Dr. J. C. Warren, in 1811. The circumstances under which he commenced his studies were very discouraging, as he had but few friends, no pecuniary resources, and from various causes, his prospects were indeed gloomy. He sustained himself under these trials with unflinching courage, and sought, by unwearied industry, to discharge with fidelity the heavy duties resting upon him.

Dr. Warren, in allusion to Dr. F., at this period, states that "he was well educated as a surgeon, having devoted a year more than usual to his preparatory studies." "He discovered at an early period, great mechanical ingenuity and mental activity."

In 1813, he undertook, in connection with Dr. Warren, the publication of a work on "The Arteries;" the first of the kind ever published; as the custom had hitherto been to describe the larger arteries with but little more minuteness than the smaller. The engravings were the work of Dr. F's own hand, and were executed with such remarkable skill, as to elicit the

highest encomiums from the best judges. The work had a great sale, and in a short time the addition was exhausted; a second was contemplated, but from some cause not issued. The book is now rare; but, for beauty and accuracy of design and execution, will compare most favorably with the best works of the present day. A few years afterwards he prepared for Dr. Warren, drawings for a publication called "Comparative Views of the Nervous System."* Dr. W. says, "the representations of the anatomy of the leach, lobster, oyster and centipede, were beautifully and accurately done, and would, I believe, do credit to any artist of the present day, for these were executed between thirty and forty years ago." "At an early period, he (Dr. F.) contrived various surgical instruments, particularly the bone-forceps, which almost produced a revolution in the operative surgery of the bones. This was long before Liston's forceps, or any other that I know of."†

In 1821, Dr. F. published, in the N. E. Med. Journal, vol. 10, p. 38, a description of his improvements on Desault's apparatus for fracture of the thigh bone, with observations on the treatment, &c. This apparatus was introduced by Dr. W. into the Massachusetts General Hospital, and has been used in that and other institutions ever since, as the most perfect thing of the kind yet discovered.

After graduating in 1815, Dr. Flagg practiced for sometime in Uxbridge, Mass.; but was persuaded by Drs. Warren and James Jackson to remove to Boston, where he commenced the practice of dentistry. About this time he married Miss Mary Wait, daughter of Mr. T. B. Wait, of the well known firm of Wait & Lilley, printers and publishers. This union proved a most happy one. Dr. F's business now increased so rapidly, that he was compelled to relinquish almost entirely the general practice of medicine, though his inclination still led him to continue the treatment of disease in its chronic forms. For a long period he was almost the only person in Boston who could, with

* See Reports Mass. Med. Soc., vol. 3, p. 307.

† Letter from J. C. Warren, M. D., Feb. 24, 1854.

propriety, be termed a "surgeon dentist,"* as his contemporaries, Drs. Randall and Greenwood, confined their attention to mechanical dentistry, leaving to him the more difficult surgical department.

In the fall of 1833, Dr. F. commenced, in connection with Dr. N. C. Keep, the manufacture of mineral teeth. In a note on the subject, Dr. K. says, "Dr. Flagg and myself had felt the necessity of a more durable article than the hippopotamus, cows or human teeth. Even French porcelain-teeth, of which there was a large assortment, though incorruptible, were unsatisfactory, because unnatural. After careful examination, we concluded that as yet nothing had been produced adequate to the wants of the profession or the community.

"At that time there were several dentists, who made and used teeth called by various names, such as 'mineral-paste-teeth,' 'composition-teeth,' 'metallic-teeth,' &c. Feeling confident that I understood the views of Dr. Flagg, and that he, as well as myself, would be willing to pay well for knowledge of any important improvement in our art, I made personal application to one of the above, offering to pay a reasonable portion of the expense, the art had thus far cost to those initiated into its mysteries.

"The answer received was short, 'I have got the art and it shall live and die with me!' No greater stimulus than this rebuff was required by Dr. F. or myself, to incite us to renewed exertions, which, we determined should not cease, but with success equal at least to that of our rival. A charlatan made his appearance soon after, who professed to understand the whole subject. He exhibited a few specimens, but would not impart the great secret and practical demonstration, unless the very moderate sum of $1000 was first secured.

"After devoting ourselves exclusively to this pretended instructor, day and night for about six weeks, my own house having been set on fire, and that of Dr. F. narrowly escaping a similar fate, we concluded that it would be best to pay off our

* I have since learned that Dr. T. W. Parsons, M. D., was practicing in Boston at that time.

humbug. Availing ourselves of such general principles, as we had obtained respecting the materials used by him, we began anew our career, for as yet we had not made a tooth which satisfied us. We received aid from our friends, the chemists, who prepared for us pure colors, and from mineralogists, who procured excellent feldspar. We planned our course on the principles of science, and kept careful records of our progress. Our success was greater than we expected. In the course of six months, we had the pleasure of knowing that we could make the best mineral teeth."

After this time Dr. F. continued his experiments in this department of his business, with untiring zeal, until a short period before his decease, never resting satisfied with his attainments, but ever striving to improve; his aim being constantly to elevate every department of his profession to the extent of his ability.*

In 1844-'5 he conceived the idea of drilling into the nerve-chamber, in order to prevent the ill consequences arising from filling over the exposed or diseased nerve. After testing the operation for between two and three years, he published the result of his observations in the Boston Medical and Surgical Journal, Jan. 27, 1847, with drawings illustrating the mode of performance.

In 1846 Dr. F. became involved in the somewhat famous ether controversy, taking an early and decisive stand against the legality of patenting such a discovery, and that, as a patent medicine, it should be used by professors of the medical school in the Massachusetts General Hospital, in violation of a by-law of the Massachusetts Medical Society. Though severely censured in some quarters, for the course he took, the justness of his views was at length acknowledged, and subsequently, Dr. Jackson freely gave the whole thing to the public.†

In 1839 Dr. F. became interested in the almost unknown

* Dr. F's forceps are too well known to require any description.

† For the details of this controversy, see the Boston Medical and Surgical Journal, of November 18th, December 2d, 9th, 16th, 23d, 30th, and the public prints of that time.

doctrine, at that time, of homœopathia, and the decided stand he took in favor of *the new system*, cost him the friendship of some of his oldest and best friends. He was the first to introduce it to the notice of the Boston public, and to the last of his life was a firm believer in the truths of its tenets. In stating the reasons for this change of opinion, he remarked that he was at first decidedly opposed to it, from the apparent absurdity of its teachings; and it was not, until he had thoroughly tested it by experiment, and witnessed the beneficial effect of the treatment in numerous obstinate cases, acute and chronic, that he gave his adherence to it. Might not his mode of investigating the subject serve as a lesson to many in the profession, who, after trying a few of the remedies, without properly understanding their use, or the mode of selection, proceed to denounce the whole system in the most dogmatic manner? After spending some months in the study of homœopathia, he carefully collected the symptoms of some cases and submitted them to the inspection of experienced homœopathic practitioners in New York and Philadelphia, who were his personal friends, and administered the remedies according to their directions. This course he pursued for some time, not trusting his own judgment in the selection of the medicines. After watching their effects in a large number of well marked cases, he became convinced that there was something more than "imagination" in the beneficial results that followed their use. In the space of a few years he collected the records of near three hundred cases, mostly of chronic disease, which were treated by himself. The results of several were published in the periodicals of the day. He confined his attention almost exclusively to the treatment of chronic complaints, as he had not sufficient leisure for those of an acute nature. The success that attended his treatment brought a large number of those suffering from long protracted disease, to his door; but finding that his own health failed from the pressure of business and close confinement, he was obliged to relinquish, in a great measure, the numerous applications made to him.

The School of Design for Women, in Boston, was among the

latest of his public efforts. It is founded on the plan of a similar one in Philadelphia. Having visited that school, and becoming interested in its object, he conceived the idea of establishing one in his native city, and had the satisfaction of living to see it placed on a firm basis, as the state has recognized its utility and testified its approbation, by an annual grant of $1,500 for three years.

As one of the pioneers of dentistry, in this country, Dr. F. deserves especial consideration. He ever regarded dentistry as one of the noblest of the professions; and it is no wonder that he watched carefully, and censured freely, any thing calculated to lower it in the eyes of the public.

He was eminently a *benevolent man;* not of that class who do good for the praise of men. He ever labored in a quiet, private way, to benefit those who required and deserved assistance; and many, now prosperous in life, can look back with the most grateful emotions to the time, when, poor and friendless, they found in "the good doctor" a friend ever ready to assist with counsel and purse, their early struggles with the world.

Having tasted the bitter cup of poverty and disappointment, and knowing by sad experience the trials of striving against hope, he could the more readily sympathize with those, who, placed in similar circumstances, needed some one to encourage and advise them. Although his kindness sometimes met with ungrateful returns, he continued unwearied in good works, and never permitted any thing to shake his confidence in, nor weaken his benevolent regard for his fellow man.

Of remarkably bland, gentlemanly address, and easy of access, he won the confidence and esteem of all who knew him. His probity was proverbial, his moral character of the highest tone, and his views liberal and enlarged. Accustomed to the free expression of his opinions, he rebuked presumption and imposture wherever he found it; and as he would never praise unless the object were really worthy, neither would he suffer any personal consideration to affect his estimate of moral or professional worth.

His last illness was but the crisis of a chronic disease. For years he had suffered from that terror of professional men—dyspepsia; and within the last few years of his life, each season found him more feeble than the preceding. Originally of a delicate constitution, the close confinement and laborious duties of his profession, increased the tendencies to gastric difficulties, year by year.

After suffering most intensely from a neuralgic affection of the stomach, for some months, and which finally increased to such a degree that not even the lightest nourishment could be borne, accompanied by extreme emaciation of body and depression of spirits, his strength yielded, and he "became immortal," departing this life December 20th, 1853.

SELECTED ARTICLES.

Some years ago we published in the Journal the lectures of Mr. Tomes on Dental Physiology and Surgery, corrected from the London Medical Gazette. The last lecture of his course was on artificial teeth. This we did not receive at the time of the publication of the others. It has recently appeared in a small 12mo volume, and we now take the liberty of giving it to our readers.—*Eds.*

ARTICLE XIV.

Instructions in the Use and Management of Artificial Teeth. By John Tomes, F. R. S., Surgeon Dentist to Middlesex Hospital, London.

I promised, before concluding this course of lectures, to give you some account of artificial teeth—their use, their construction and their management. I will now redeem my pledge;

but I must be brief, for we have but one lecture at our disposal, and the subject is a large one.

Most of you are about to enter on the path of general practice, and in the exercise of your calling, will have, from time to time, to prescribe the use of artificial teeth to those of your patients who have lost the natural organs of mastication, and are suffering from dyspepsia, consequent on the food being carried into the stomach before it has undergone a sufficient amount of comminution. It is fit, therefore, that you should possess some general information on the subject, and that you should be able to instruct your patients in the management of the apparatus which you have found it necessary to recommend for their use. I shall therefore endeavor to give you such information as the wearer of artificial teeth will find it advantageous to possess.

The duration of human life is proportioned to the perfectness or imperfectness with which the various functions that collectively constitute life are performed. These functions are the work of organs on materials submitted to their action. It is obviously necessary that before organs can work well, they shall be well formed, and fully endowed with power to work. But it is equally necessary that the materials submitted to them shall in all respects be such as they can readily, and without unusual effort, act upon.

Digestion is one of these functions, and it is one of the first and most important; for without it others can go on but for a while, and if it be deranged, others become more or less disordered as a consequence.

Digestion consists in the reduction of the various articles taken as food to a pultaceous mass called chyme, from which the more purified nutriment, chyle, is eliminated. This is carried into the circulation, through a set of vessels destined for the purpose, mixes with and becomes blood.

The reduction of food to chyme is in great part a chemical action: a fluid is furnished by the stomach which dissolves the food.

Substances taken as food, irrespective of their relative solubility, are dissolved by the gastric fluid, quickly or slowly, in proportion to their degree of permeability or comminution; or, in other words, in proportion to the surface exposed to the action of the solvent. So it happens that a solid morsel swallowed whole may remain in a healthy stomach many hours before it is dissolved, while had the same morsel been crushed, or broken up into many pieces, and in that process mixed with saliva, and then swallowed, it would have been reduced to pulp in an hour.

In the one instance, the function of digestion is duly performed; in the other, it is retarded.

Hence it is of paramount importanee that the food, before it is introduced into the stomach, should be retained in the mouth, while it is properly crushed, divided, and thus rendered pervious to the gastric juice, in other words, that mastication should be perfect. To effect this purpose, we are provided by nature with a special apparatus, with suitable crushers—with teeth.* To the dentist is entrusted the care of these important organs, to keep them in repair, and to replace them when lost.

I have told you how to preserve them, how to repair them:† I will now tell you how they may be replaced. How, on the one hand, you may preserve the probabilities of life by preserving the organs of mastication; how, on the other, you may regain the lost probabilities by forming efficient substitutes for the lost organs.

But there are other, though less important, yet sufficient reasons, why we should use our best endeavors to preserve our natural teeth; and, when lost, to replace them by artificial teeth.

Teeth—and especially front ones, natural or artificial—are necessary to distinct articulation; and we owe it to ourselves, and also to those with whom we converse, that we should, if

*The admixture of saliva with the food is necessary, otherwise mincing would answer the purpose of mastication, which is not found to be the case.

†Lectures on Dental Physiology and Surgery.

possible, be readily and distinctly understood—that our utterance should be perfect.

The absence of teeth deprives the face of much of its character, and the appearance of old age is imprinted at a period when, under ordinary circumstances, health and strength remain. In this case it is due to ourselves, and more especially to those about us; and also, though in a less degree, to all with whom we meet, to preserve our natural and healthful appearance by all available means. It is not natural for young or middle-aged people to be without teeth, and it is not unnatural for old people to have them.

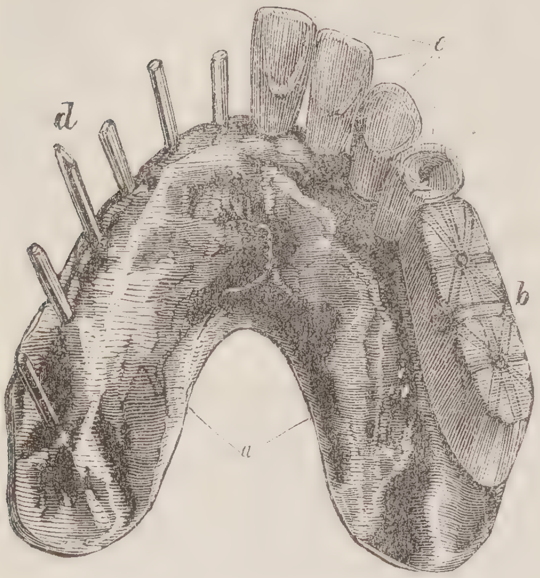
We are in no danger of over-rating the value of the dental apparatus, so long as we consider it as one only of the many parts that compose the human system, the well-being of each of which is necessary to the well-being of the whole, and therefore to health and comfort, and through these to longevity.

I will now endeavor to give you some account of the various kinds of artificial teeth, of the principles on which they are severally constructed, and of their applicability. I cannot, however, give you a detailed description of their manufacture; neither would the description be useful if I did. The constructive process must be seen to be understood, and practiced to be learned. Nor can I enter into details on the modifications in form that the peculiarities of individual mouths may require. To do so would occupy many lectures instead of one. On the contrary, I can only sketch briefly the general principles of construction, and in doing so, shall confine my remarks to complete, or nearly complete, sets, or half-sets, unless it be otherwise stated; and my remarks will have especial reference to the mode of use, and methods of preservation.

The natural teeth have fangs, which pass through the gums, and are socketed in the jaws. In artificial teeth, we must have a part corresponding to the fangs, but here it must be spread over and rest upon the gums, and through it, as through the fangs of natural teeth, the pressure of mastication must be communicated to, and borne by, the jaws. This part we shall call the *base*, or *foundation*, since from it the crowns of the

false teeth must rise. (Fig. 1, *a*.) The base is an essential

FIG. 1.



part of all artificial teeth, whether they be few or many; and upon the accuracy with which this fits the gums, will the usefulness of the imposed teeth depend. Indeed, unless it fits tolerably, the teeth cannot be worn; and, for this obvious reason, that the pressure of mastication will be communicated to those parts only of the gums on which the base bears. If the area of these be small, the parts will be bruised; if they be still smaller, they will be cut. The greater the area over which the pressure is diffused, the less will it be felt; the smaller, the more. We all know what would be the consequence if the area were reduced to an edge or a point; yet there are not wanting instances where, from inattention to these simple facts, the bases of false teeth are so badly constructed, that the gums are bruised or cut the first time they are worn, and this from the ill-fitting or insufficient size of the base. Hence, in estimating what would be the probable value of artificial teeth in any particular case, the first consideration will be, whether the base can be made to fit perfectly, and whether of sufficient superficial extent. If both of these points can be, and are attained, the base will, when pressed on the gums, bear pretty equally over the whole surface it covers, and when so pressed, will squeeze from between itself and the surface of the gums, both the saliva and the air; and will then be retained in its position with considerable force by the at-

FIG. 1.—Artificial teeth for an edentulous upper jaw, showing, *a* the base of gold; *b* the side block which takes the place of molar teeth; *c* the front teeth; *d* the right side of the base, with pins soldered to the base for fixing the teeth and the side block.

mospheric pressure acting on the non-fitting surface only. And, further, it may be foretold, that if the subsequent stages of construction are successfully conducted, the new will be very useful substitutes for the lost teeth.

The base of artificial teeth is usually formed either of sheet-gold, or of dentine, or ivory, as it is more commonly called,* the dentine of the hippopotamus, or of the walrus-tooth, and by the following means:—Beeswax, previously softened by immersion in hot water, or exposure before the fire, and well kneaded, and then placed in a horse-shoe shaped tray of suitable size, is introduced into the mouth and carefully pressed against the gums until they are perfectly imbedded. The tray of wax is then as carefully withdrawn, and, if successfully, it will present a perfect mould, or counter cast of the gums. Into this plaster of paris is poured, and allowed to set; after which it is removed from the wax by softening the latter. The plaster then presents a cast, a fac-simile, both in size and form of the gums, supposing, of course, the mould to have been correct.

It was usual in my practice, and I believe in that of other dentists, to assume the cast of the gums obtained by the pres-

* The material employed for making the base is obtained either from the tusks of the walrus, hippopotamus, sometimes the teeth of the sperm whale, and now and then portions of the tusk of the elephant are used. These teeth or tusks are composed of two or three substances; the central substance is dentine, and forms nine-tenths of the whole tooth; external to this, in certain parts of the tooth, is the enamel; and external to the enamel is a third substance, called cementum, which is the softest of the three. In the tusks of the walrus, whale, and elephant, the enamel is absent in teeth fitted for dental purposes, and the cementum coats externally the dentine. Teeth so constituted are in commerce called ivory, which term includes both the dentine and cementum. But as the latter substance is not suitable, in consequence of its comparative softness and disposition to discolor, and is, therefore, rejected, the term ivory would not definitely express the nature of the material employed in making artificial teeth. I have, therefore, adopted the term dentine, as being expressive of the material used, and as being that by which this substance is designated in scientific writings. Dentists, when speaking of this substance, usually call it bone, and sets of teeth made of dentine they call bone-sets, although the material differs very consiberably from bone, in possessing the qualities of great hardness and compactness, the absence of which renders the latter substance totally unfit for dental purposes.

ent process to be correct, and upon that faith to proceed to construct the teeth to fit the plaster cast, until about four years since, when I had the good fortune to discover means whereby the correctness of the cast could be readily tested. Since this time, I have always availed myself of the test previous to constructing the teeth.

The means I allude to, with other appliances for teeth-making, formed the subject of a patent in 1846. It consists in the compounding of a material like in composition to extremely hard sealing-wax, but which is soft and plastic at the temperature of boiling water, though hard and unyielding at that of the human body. This material, when softened, is moulded on the plaster cast into the shape of the required teeth. Thus we have, at a very trifling cost of time, a model of the new teeth, on which, by the aid of a little hot water, we can work any required changes, should it, on being placed in the mouth, need any. And this, of course, will depend on the faithfulness of the cast on which it has been moulded. If the cast be correct, the model will fit equally well both the cast and the mouth; but should the cast be faulty, the model made on it will not fit the mouth, whereby we discover the error in the cast, and proceed to its correction. The faulty cast is thrown away, and the composition model is slightly softened by immersion in hot water. When in this state, it is carefully moulded to the surface of the gums, and then allowed to harden. When hard, it is again put in the mouth, and if found to fit, is used to furnish a plaster cast in the same manner as the bees-wax mould did in the first instance. By these means we obtain a known *perfect* cast, to which we may make the new teeth without fear of failure. Should gold be chosen for the base, casts in metal, zinc, or brass, are made from the plaster cast, and from these again counter-casts, or reverses in lead are made, between which and the cast, gold plate is hammered, until it has assumed the form, and fits perfectly to the surface of the cast; and, of course, also to the gums.

If dentine be chosen for the base, it is usual to cover the plaster cast with red pigment, and to place upon it a block of

dentine in the position it is required to take when fitted. The block will at first touch only at, or on two points, and these will be marked by the adhesion of a little of the pigment. The points so indicated are cut away with small tools, similar to those used by engravers. The contact is renewed, and the reddened points again removed. In renewing the contact between the block of dentine and the paint-covered cast, great care should be taken to keep the two in the same relative position as on each preceding occasion. This tedious and somewhat uncertain process is repeated again and again, to the extent of many hundreds of times, till the block is at last cut to fit the surface of the cast. The superfluous portions are then removed, and the base so made is prepared for the reception of the teeth.

In my own practice, the base is carved by a patent machine, which altogether supersedes the hand carving and the use of pigment. A model of the required teeth is made in the moulding composition, and this is fixed in the machine, and then copied into dentine with much saving of time, and without liability to error.

For the invention of this instrument, I had the honor to receive a gold medal from the Society of Arts.

There are, however, a few workmen to be met with, who, from great practice and a considerable amount of ingenuity, produce results that can scarcely be surpassed. But such men are not numerous; hence, their services cannot at all times be commanded.

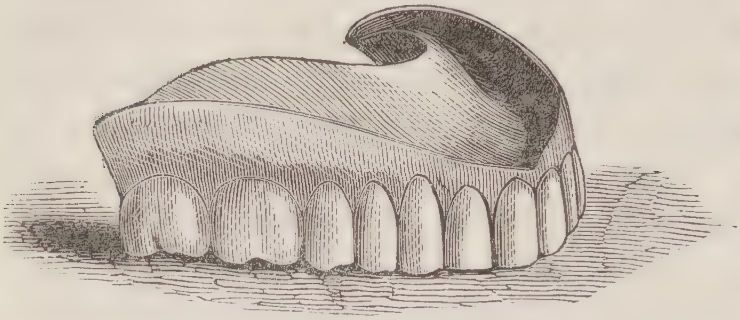
The base, so far as its gum-fitting surface is concerned, having been finished, we have next to select the teeth which the base is destined to carry.

Teeth used in making artificial teeth are of three kinds: human teeth, mineral, and carved teeth—that is, teeth carved out of dentine. The latter, when dentine is used for the base, are carved out of the same block in one piece, as shown in fig. 2. When natural or mineral teeth are selected, they are fixed to the base by pins.

In speaking of artificial teeth, dentists divide them into front

teeth and side blocks. The front teeth are like, and have the same names as the natural teeth, including the bicuspides (fig. 1, *c*;) while those corresponding to the molar teeth are made in one continuous piece, and are called the side-blocks of the piece (fig. 1, *b*.) I should here tell you that the teeth, whether few or many, with their base, when spoken of as a whole, are termed by dentists a *piece*—an upper or under piece, as they may be for the upper or lower jaw.

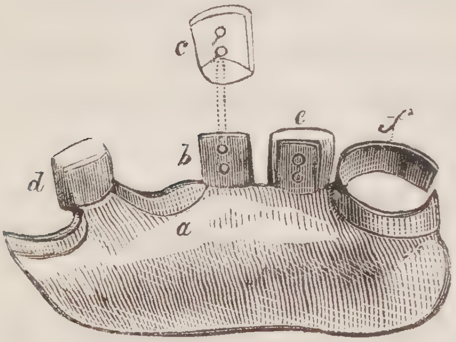
FIG. 2.



The teeth are fixed to the base by pins passing through, or nearly through the centre of each tooth, and soldered to the gold, or riveted through the dentine, according as the base may be composed of the one material or the other (fig. 1, *d*.)

Should a tooth, when in wear, come off its pin, it may be temporarily refixed by wrapping a little fine silk round the pin, and then replacing the tooth.

FIG. 3.



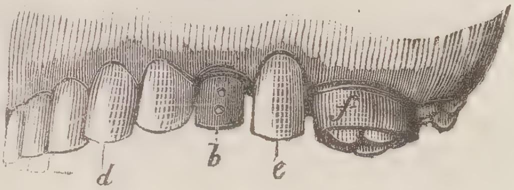
The American and French dentists frequently use teeth, from the back of which small platinum pins or bands project, and these are soldered to small vertical plates of gold, which have been previously fitted to the base, as shown in fig. 3. In this country, mineral teeth made on the above plan, are used in

FIG. 2.—Artificial teeth for an edentulous upper jaw, with the base and the teeth carved out of a solid block of dentine, and retained by atmospheric pressure without springs or clasps.

FIG. 3.—Three teeth for the upper jaw: *a*, the base; *b*, a vertical plate of gold soldered to the base, and perforated to receive the pins of an American tooth; *c*, the tooth, with the pins projecting from the inner surface; *d* and *e*, two teeth soldered to the vertical plates; *f*, a band for clasping a molar tooth.

in cases where, from the relations of the upper and lower teeth, peculiar strength is required. Should a tooth break off the gold, the back usually remains standing, as shown in fig. 4, *b*; against which a little white wax may be moulded, if a dentist be not at hand to make the necessary repair. I once met with a lady who had, for six months, worn wax teeth moulded on to the gold backs of a set of American teeth. She informed me that the wax required to be renewed every third day, and that her friends had not detected the injury the teeth had sustained.

Fig. 4.



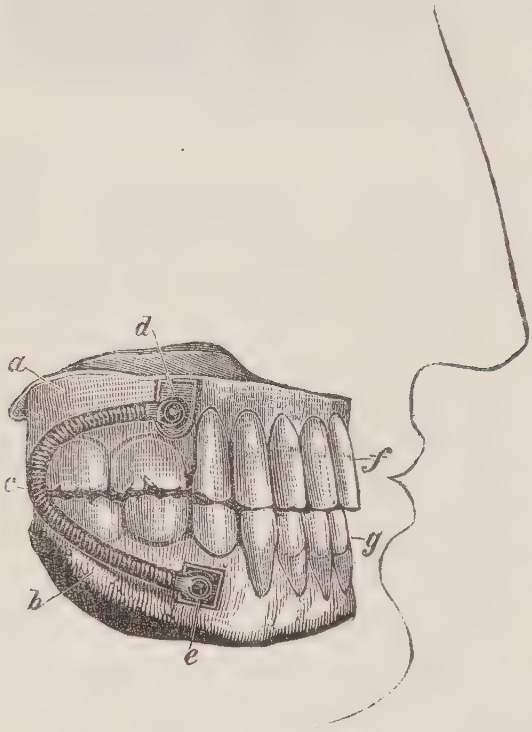
The piece having been so far finished, the *bite*, or closure of the upper and under teeth, must be adjusted; that is, the teeth of the two jaws must be so adjusted that, on closing the mouth, all meet at the same moment. Should the teeth of one side meet before those of the other side of the mouth, the piece will be displaced at each attempt at mastication; or if the more posterior parts meet before the anterior teeth, the same result would occur. If, when the teeth are put in, the error is considerable, the more prominent parts will be readily seen, and may be removed; but when the bite or closure is nearly perfect, recourse may be had to pigments. The upper or under teeth, as the case may require, must be covered by the paint, and the points of contact, when marked by closing the mouth, removed by the graver or file, until, on trial, all parts receive equally the color from the opposing teeth.

In my own practice, I use the composition I have before spoken of. The piece is moulded in this, and the parts corresponding to the side-blocks and teeth slightly softened by heat, so that when the mouth is firmly closed, those parts which are too prominent will yield till the proper level is obtained. The bite thus gained is copied in the artificial teeth.

Fig. 4.—A view of the same teeth as shown in fig. 3, but placed in the mouth: *b*, the vertical plate of gold for the attachment of a tooth; *d* and *e*, teeth fixed to similar plates; *f*, the band encircling the molar tooth.

Artificial teeth are retained in the mouth by three different plans: (1st) by spiral springs attached by their ends to the pieces of the two jaws, when the set is complete, as shown in fig. 5, or when the under teeth are perfect, to caps fitted to these teeth.

FIG. 5.



The springs themselves are made of gold wire, twisted spirally round a small piece of cylindrical steel. They are fixed to the teeth by a swivel or loop, through which a pin passes into the base or to the blocks; while the swivel itself terminates in a piece of wire, which exactly fits into the interior of the spring, into which it is pressed. These parts are delineated in fig. 6. With this arrangement the springs are readily detached, even by the patient. Should the spring fit too loosely on the swivel, a little floss silk should be wrapt round the latter before pressing it into its place in the spring. And this, too, may be done by the patient, should a spring accidentally leave the swivel.

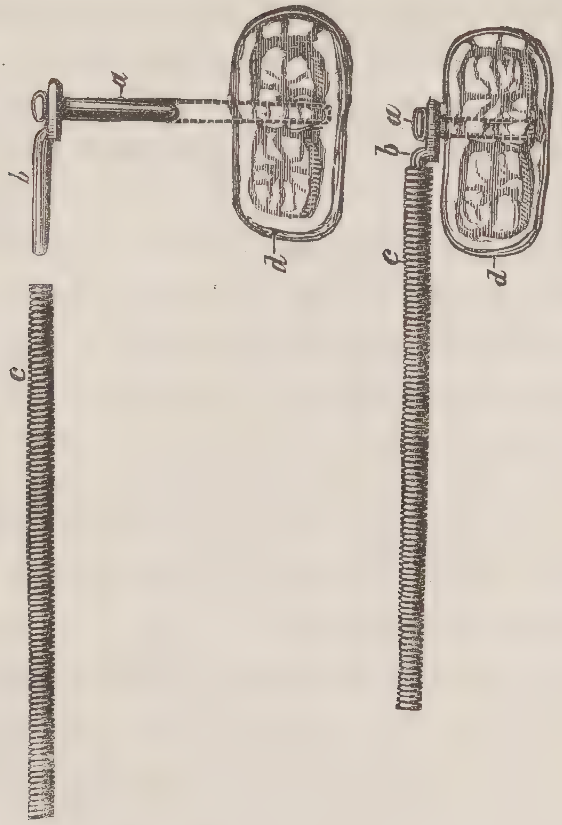
The pin on which the loop moves is either passed through the side block, as in fig. 6, *a*, or screwed into or soldered to the gold base, as shown in fig. 5, *d*.

(2nd.) By clasps, or bands, of elastic gold, passing partly round natural teeth. The clasp is attached in a part only of

FIG. 5.—A complete set of artificial teeth shown in the position they occupy in the mouth; *a* and *b*, the side blocks of the upper and lower teeth; *c*, the spring in its proper position when the mouth is closed; *d* and *e*, the pins by which the spring is attached to the upper and lower teeth; *f* and *g*, the front teeth.

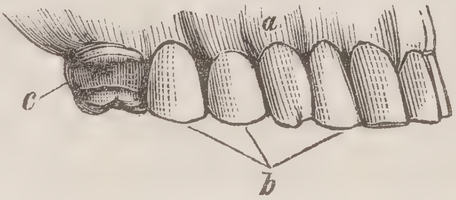
its length to the base, the remaining portion is left free, and

Fig. 6.



springs open to receive the tooth. If at any time the clasp does not firmly embrace the tooth, it is only necessary to bend the free portions towards each other to make it do so; it will then again take firm hold, and present the appearance shown in fig. 7.

Fig. 7.



(3rd.) By the pressure of the atmosphere. The fitting surface is so accurately fitted to the surface of gum, that the saliva and the air are excluded, whereby the pressure of the atmosphere acting only

Fig. 6.—Spiral springs, with the apparatus for attaching them to the teeth: *a*, the pin which passes through the loop or swivel *b*, into the block *d*; *c*, the spring. In the left hand figure the several parts are shown detached, with dotted lines indicating their position when fixed. In the right hand figure, they are shown in their proper positions.

Fig. 7.—Three artificial teeth for the upper jaw, on a gold base, fixed in the mouth by a band: *a*, the gums; *b*, the three new teeth; *c*, the band, which, from its situation in the back part of the mouth, is not seen.

on that surface of the teeth exposed to the tongue, holds them in tight contact with the gums. Such a piece is shown in fig. 2.

Teeth on this principle, though the most difficult to construct, are, in some respects, the best kind when well constructed, seeing that they are, in great part, independent of any remaining natural teeth of the same jaw, and also of those of the opposite jaw.

It may be stated, generally, that when a complete set of artificial teeth, both for the upper and lower jaws is required, spiral springs are best adapted for their retention in the mouth; but if two or three teeth only are worn, clasps will prove most effective. Then, again, when a number are required for one or both jaws, while a few natural teeth remain; or even supposing the teeth are all gone, and the gums are favorably shaped, the artificial teeth may be retained by atmospheric pressure, or *suction*, as it is sometimes called.

In advanced age, the alveolar ridge, which supports and gives convexity to the gums, is in many individuals completely removed, and the roof of the mouth rendered quite flat. In such cases, teeth on the pneumatic principle will not be steady, but, on the contrary, they will glide about just as you may have seen two flat metallic surfaces, when inclined to a slight angle, slide readily off each other even by their own weight, though they required considerable force to separate them when applied at a right angle to the surfaces in contact. From these facts you will readily infer, that teeth so made will, if fitted with perfect accuracy, be effective in proportion to the amount of surface presented in the base and to the convexity of the gums.

The amount of atmospheric pressure will, of course, be proportioned to the surface of the base, and the freedom from lateral sliding in proportion to the convexity of the gums, unless there be teeth remaining in the jaw to steady them.

Pneumatic teeth are usually made of dentine, while those retained by clasps commonly have a gold base. Sometimes the base is made of dentine, and fitted round or between remaining natural teeth, and is thus retained. Then, again, teeth may be constructed to be retained by a combination of two of these plans.

Indeed, the combinations and modifications of plans available in the construction of artificial teeth are very numerous, and upon the successful adaptation of these to special cases does the usefulness of the dentist depend. No two mouths are exactly alike, and hence no two admit of precisely the same form of teeth; out of this endless variety in form arises the difficulty of producing an equally successful result in each individual case.

The base having been completed, the teeth mounted and fixed, and the bite adjusted, the teeth must be given to the patient for wear, who must be directed to return on the following day should the mouth feel sore. If, when your patient returns, you find, on inspecting the mouth, that the base of the teeth has pressed on one part more than on another, and caused redness, the base at that part must be reduced by filing or it must be bent away from the injured part; and these operations of adjustment must be repeated from time to time till the teeth become easy; always taking as your guide the state of the mouth rather than the statement of the patient.

You might, at first thought, suppose that artificial teeth, when well made, would require no after adjustment to the mouth; and in many cases they do not—in others they require but very little: yet, again, they may require a great deal; and for the following reasons:—The base may press equally on all parts, but all parts may not bear pressure equally well. Then again, some parts of the jaw may be covered with a greater thickness of gum than others. Under pressure the thicker parts of the gum will yield, and leave the thinner to sustain the pressure that should be equally distributed over the whole. The points so pressed on will necessarily become sore, unless the piece be adjusted to relieve them.

The first effect, on putting in a complete set of artificial teeth, is most unquestionably great discomfort; the mouth feels filled, the speech rendered difficult and indistinct, and mastication impossible: yet, within a fortnight, or three weeks at most, and often within even a week, all those difficulties vanish, and the patient tells you he could not do without new teeth. Distressing nausea is amongst the occasional early consequences of wearing artificial teeth, but this also subsides with a little patience.

To masticate well with false teeth requires both time and perseverance, the ability being acquired sooner or later in proportion to the aptitude of the individual. But all may acquire it if the teeth be well made, and properly adjusted so that pressure on them does not produce pain.

The patient should, however, return to the dentist whenever the teeth give pain from pressing more on one part of the gum than on the other, that the unequal pressure may be removed before the surface of the gum has become abraded. To persevere in wearing teeth which press unequally on different parts of the mouth is in every way disadvantageous, and prolongs unnecessarily the period of discomfort.

There are a few persons, however, whose jaws are so formed that sufficient available bearing surface for the base can scarcely be found. There are others, again, in whom the lining membrane of the mouth is so irritable, either naturally or from habits of intemperance, that the presence of artificial teeth cannot be borne—or, at least, without great effort. But if the effort be made and continued, and the teeth are good in construction, and well adjusted, success, even in the most difficult cases, will certainly ensue.

In all cases, however, whether the teeth be few or many, whether for one jaw or both jaws, the construction and adjustment must be left to the dentist, who will at all times avail himself of any suggestions the patient may offer, if they be such as can be adopted with advantage.

It is particulary desirable that the patient should place himself wholly in the hands of the dentist, who, if unshackled with conditions, will be in a position to do the best he can to make him comfortable. The difficulties of making and adjusting artificial teeth really well, are great; and the first impression a new set of teeth produces when put into the mouth is so strange, that great confidence is required on the part of the patient, otherwise he loses hope, embarrasses the practitioner with exaggerated complaints, and thereby endangers the success of the operation.

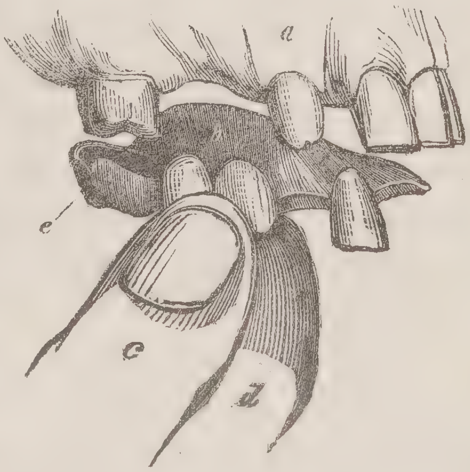
Artificial teeth must be regarded by the wearer as tools, the use of which have to be learned by patient trials. The first

time you take up a joiner's plane, you cannot work it, nor would you expect to do so without previous practice; so, with artificial teeth, you have no right to expect to masticate effectively with them until by practice you have learned their use.

I would recommend that patients before they wear new teeth should carefully examine them in their several parts, and actions, and thus learn how they should be used, and what is to be expected of the teeth and what of themselves in acquiring the art of masticating with artificial teeth. If this expedient be adopted, many ill-conceived attempts, and consequent failures productive of disappointment will be avoided.

Whatever may be the construction of the teeth, some little care is required in putting them into, and removing them from the mouth. It is by no means uncommon for those who are unpracticed in their use to do them serious damage in the one or the other of these operations. In sets of teeth retained by springs, the teeth themselves seldom receive any material injury, but the springs are frequently damaged, and not uncommonly rendered worse than useless by treatment which the wearer does not know there is any occasion to avoid. The following directions are given with the hope of lessening the frequency of such accidents, and they will be accompanied with a description of the manner in which the injuries are usually produced; so that not only may the proper methods of procedure be seen, but also the faulty ones.

Fig. 8.



Teeth which are retained by clasps similar to those which are represented in fig. 7, should be held with the thumb and finger resting on the sides of the teeth, and placed in a line with their intended position in the mouth, in the manner shown in fig. 8.

Fig. 8.—The three teeth as in figure 7, with the manner of holding them in placing them in the mouth: *a* the gums; *b* the base of the teeth; *e* the band; *c* the forefinger; and *d* the thumb.

The clasps will then pass around the extremities of the crowns of those natural teeth they are destined to embrace. When, by the aid of a mirror, they are seen to occupy that position, the teeth should be gently pressed till the base of the apparatus comes in contact with the gum. The base itself should then be pressed with the thumb, or finger, firmly on the gum.

If the artificial teeth occupy a space on each side of the mouth, the two hands should be used in putting them in, and the two thumbs in pressing the base on the gum.

These directions apply more particularly to the teeth for the upper jaw. In those made for the lower jaw, the thumb and finger should be used, but with the finger placed against that side of the teeth which lies next to the tongue. When the teeth occupy one side of the mouth only, it is best to use the hand of the corresponding side in placing them.

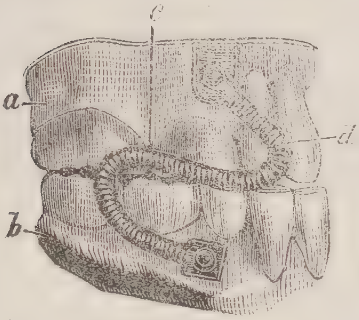
It must, however, be always borne in mind, that no force should be used, otherwise the teeth will be injured; for, if on making an attempt to put the teeth in the mouth they will not with gentle pressure readily pass into their place, the position is incorrect—they should be withdrawn, and sufficient time taken to get them in the proper position before again attempting to press them into the mouth.

The difficulties which are implied to exist by the directions which I am giving are confined to the first few days of wear. Those who have become accustomed to artificial teeth of this kind can put them in not only without the aid of a mirror, but also without the presence of light. They may, after a little practice, be taken out and returned to their place without the bystander becoming aware that his neighbor has other than natural teeth.

In removing teeth constructed on the foregoing plan, the finger nail or nails should be placed between the edge of the clasps and the gums, and then, by moderate pressure, the teeth may be withdrawn without any fear of injuring them. If the teeth extend to each side of the mouth, care should be taken to move the two sides of the teeth at the same time, otherwise the base may be bent out of shape.

Teeth retained by spiral spring require considerable care in putting them into the mouth. The wearer not unfrequently injures or entirely destroys two or three pairs of springs by bad management, before experience has taught the manner of avoiding such accidents. The proper position of the springs when the teeth are in, and the mouth is closed, is shown in fig. 5, and any deviation from that position will be attended with injury to the apparatus. If, for instance, a spring should get into the position shown at fig. 9, it will be so damaged, if not absolutely broken, that its action will ever after be imperfect; or if it should be allowed to project forwards towards the lips, great inconvenience will be felt, and the spring, if not speedily released, will most likely be permanently injured.

Fig. 9.



In order to avoid these unpleasant accidents, one or other of the following methods of putting the teeth into the mouth may be adopted:

In one method the upper and lower teeth should be placed with the masticating surfaces in contact, and with the springs in the position shown in fig. 5; the forefingers should then be placed over the upper and the thumbs under the lower teeth. In this manner the upper and lower teeth can be held firmly together: when so held, one side should be passed a short distance within the lips, and with it the cheek pressed outwards. By this means the mouth will be stretched sufficiently open to allow the other side of the teeth to be introduced without any fear of the spring becoming entangled with the lips, which, but for this precaution, would probably pass in between the spring and the teeth.

Having once got the teeth fairly into the mouth, they will almost of themselves find their proper position on the gums. However, it is desirable to press the base well into its place before attempting to close the mouth.

Fig. 9.—Side view of a set of teeth, with *c* the spring bent in a double curve, and injured at *d*; *a* and *b* the upper and lower side-blocks.

The second method to which I alluded is effected in the following manner. Instead of placing the upper and lower teeth in the mouth together, the two parts of the set may be put in one after the other.

The upper part of the set may be first pressed lightly into its place and held there by the help of the tongue. The lower division will then project from the mouth, and the springs connecting the two will remain straight, or nearly so. The second step of the process—that of placing the lower teeth—needs some little care, or the springs will suffer more or less injury in the operation. The forefingers should be placed on the masticating surface of the teeth, in doing which the springs will be

FIG. 10.

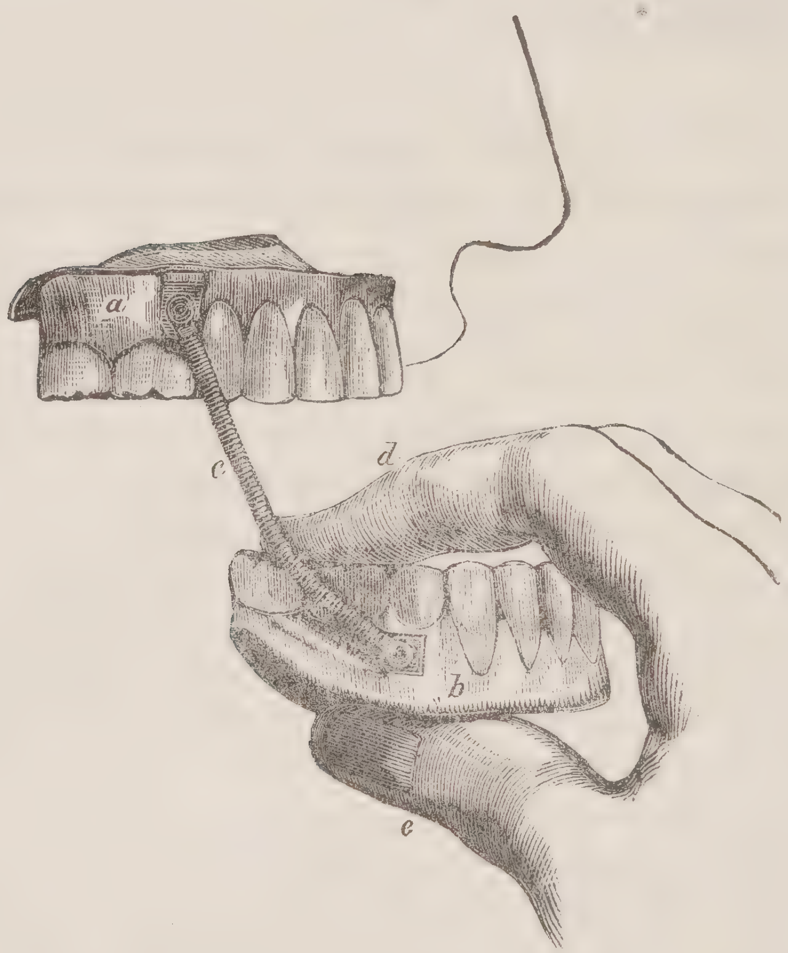


FIG. 10.—Side view of a set of artificial teeth, showing the manner of putting them into the mouth; *a*, the upper teeth placed in the mouth with the spring, *c*, projecting forward; *b*, the lower teeth, with the forefinger, *d*, placed on the masticating surface, and bending the spring slightly backwards; *e*, the thumb.

pressed a little backwards, so as to make a backward curve, extending through the whole length of the spring, and similar in direction, though less in degree, to that which they assume when the teeth are properly placed in the mouth. Having grasped the lower teeth, and got the springs in the proper position, in the manner described and shown in fig. 10, they may, without difficulty, be pressed into the mouth.

In some sets it will be found more convenient to place the lower teeth in the mouth first. In such a case the upper ones should be held in the left hand, while with the right the lower teeth are laid upon the gums. Having done this, the thumbs should be placed on the masticating surface of the upper teeth,

Fig. 11.

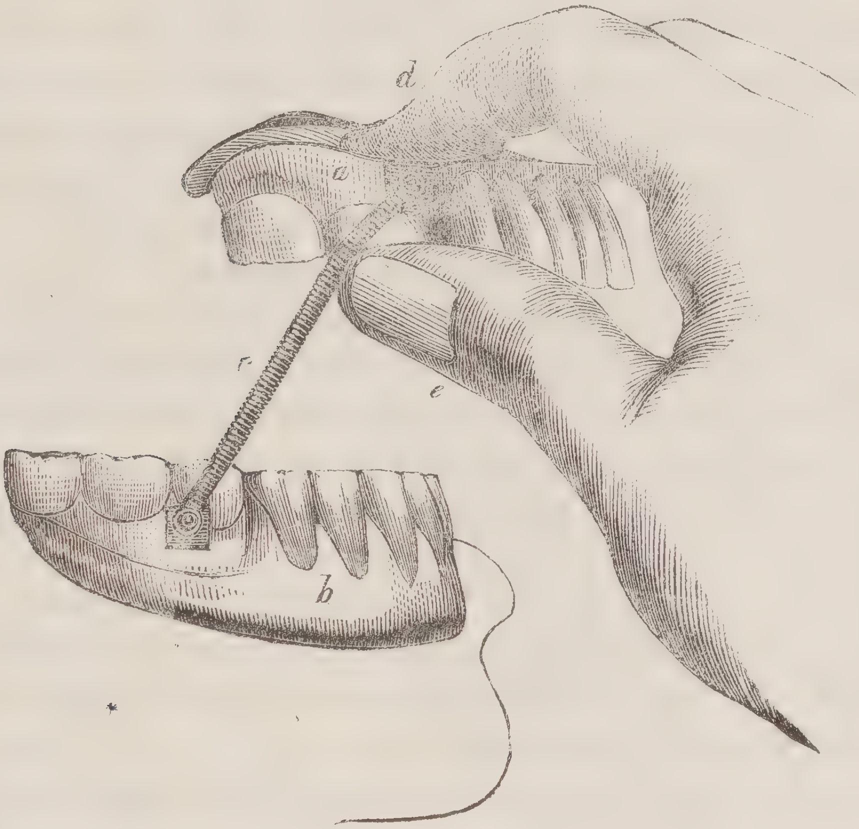


Fig. 11.—Side view of set of teeth, showing the manner of putting them into the mouth when the lower teeth are first placed: *b*, the lower teeth already placed in the mouth; *c*, the spring projecting forwards and upwards; *a*, the upper teeth; *d*, the forefinger; *e*, the thumb placed on the masticating surface, so that in pressing the upper teeth into the mouth, the spring will assume its proper position.

in which act the springs at their middle part should be pressed backwards towards the mouth, in the same manner as I have described when speaking of the lower teeth, when they are the last to be introduced. The teeth being grasped in the manner shown in fig. 11, and the springs bent backwards in a single curve, they will readily pass into the mouth.

It will be obvious, on again referring to figs. 10 and 11, that whether the upper or lower teeth be placed first, the ends of the springs attached to that half of the set which is first put in the mouth will come forward in the opposite direction to that which they hold when both parts are in the mouth. But it not very unfrequently happens that the springs will not move forward in the manner described with equal readiness in two halves of the set. In the one half they may come forward without difficulty, while in the other they are subject to considerable lateral flexture if the attempt be made, endangering the integrity of the springs. Hence this point should be ascertained, and that division of the set should always be introduced first, on which the springs can readily come forward. If the other division be first placed, the springs will be bent laterally, and, on introducing the other part of the teeth, will not go back into their proper position; the curve backwards will commence at the termination of the pin of the loop, in the manner shown at *d* in fig. 9, and the springs will either be broken off at that point or will be permanently bent.

In removing the teeth from the mouth that division on which the springs will not move forward should be first taken out, otherwise they will be injured almost as badly as though the same part had been first introduced.

A spring which has once been permanently bent can never be restored to its former condition, and from that time will act but imperfectly.

I may here remark that springs, however carefully manufactured and used, will sometimes break suddenly and without any obvious cause; hence those who are dependent on them should have a second pair, unless they have a second set of teeth.

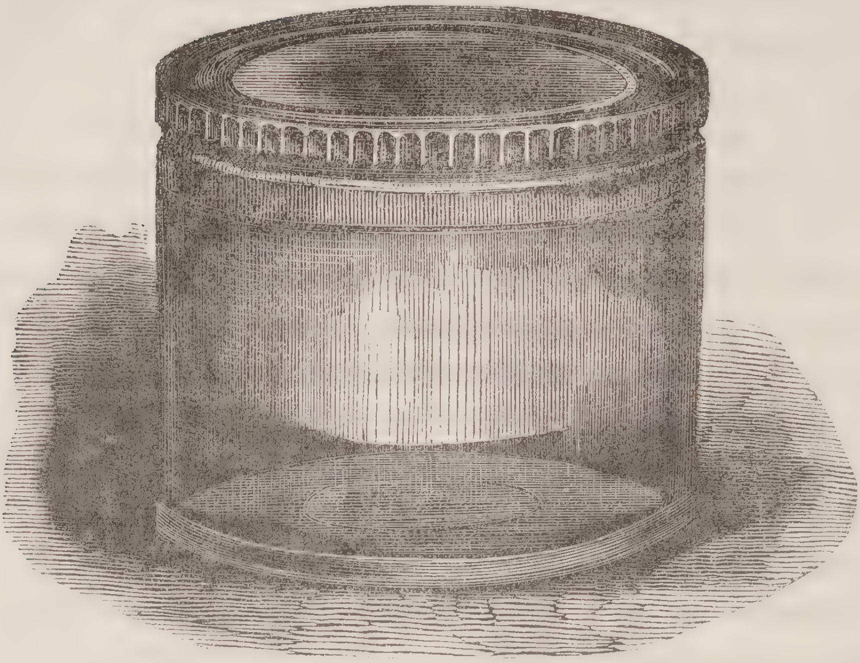
It will readily be seen from what has been already said, that

it is of great consequence the spring should move freely on the swivels, otherwise it will be almost impossible to avoid an accident.

It is of great importance that you should know how to preserve false teeth, for in the absence of proper attention they are soon destroyed, and still sooner become offensive. The wearer often seems singularly unconscious of the offensive odor which arises from neglected teeth—not so, however, the bystander; he is almost poisoned by the offensive breath of his neighbor. Dentine is used to some extent in the construction of most sets of teeth, and this substance, you are aware, if neglected, is soon acted on by the saliva, and gradually suffers decomposition: hence arises the bad breath.

I have told you on several occasions, and I again repeat, that dentine, when highly polished, resists the solvent action of the saliva, and, therefore, is not subject to decomposition. The wearer should pay great attention to this point. The surfaces of the teeth (whatever be their kind) should be well brushed with a little precipitated chalk, once or twice a day; and, after brushing, rubbed with a dry soft towel, or handkerchief, or a piece of wash-leather. By these means a beautifully polished surface may be maintained. When not in the mouth, teeth which have dentine, or natural teeth entering into their construction, should be kept in a well-stoppered glass jar, filled with two-thirds of spirits of wine, and one-third of water. Such a jar is shown in fig. 12. The antiseptic quality of the spirit aids much in preserving the dentine, and moreover keeps the teeth sweet. By great attention, cleaning, and emersion in spirits of wine, when out of use, artificial teeth will last quite as long again as they would if these means were neglected. If, however, gold and mineral teeth are alone used, then it will be sufficient to place them in water, after they have been well cleaned. Artificial teeth cannot be too well kept, but they can be very easily, and frequently are, too ill kept. If the base be gold, and the teeth mineral, still they should be well cleaned each day: if the base be gold, and the teeth dentine, there is yet greater need of frequent and careful cleaning. If the base be of den-

Fig. 12.



tine, and the teeth natural teeth, the piece will soon be destroyed if cleaning be neglected. Nothing short of never removing artificial teeth from the mouth should be more strongly deprecated than the habit some people have of taking them out only one or twice a week, and at other times cleaning them in the mouth. They cannot be well cleaned when in the mouth, and the surface of the mouth cannot remain healthy when perpetually covered. For it must be borne in mind that the gums, like skin, are covered with a membrane composed of minute adherent scales called epithelium, and that it is the nature of this tissue to be perpetually forming below, while it is suffering perpetual loss from its surface. The external scales of which it is composed are rubbed off by the friction of the tongue and the food. Now, if the epithelium be perpetually covered by the base of artificial teeth, the formation will still go on, but the loss from the surface is retarded. The outer epithelial scales may separate, but cannot escape from the surface; they, therefore, accumulate under the base, and there become highly offensive. After a while, the mucous membrane inflames, and the

Fig. 12.—A glass jar, with parallel sides, and stopper accurately ground, suitable for containing artificial teeth.

development of epithelium is suspended or vitiated; the scales no longer adhere to each other to form a membrane. If the teeth be removed after the mouth has got into this condition, the surface which has been covered will be found red and vascular, and will bleed on the slightest touch. The fitting surface of the teeth will be coated with a highly offensive white cheese-like matter.

Artificial teeth should not, as a habit, be worn during the night, unless their presence is necessary to the comfort of the patient, or for the preservation of the remaining natural teeth. In either case it is desirable that the patient should have a set for the night—a set with a much smaller base than those used for mastication; and, when practicable, a piece fitted to one jaw only, and extended to the opposite jaw for the gums to close on. All that is required of night-teeth is, that they shall keep the jaws apart. The surface of the gums is, in the natural state of the mouth, uncovered, bathed with saliva, and subject to friction; it is desirable, therefore, that it should be left free eight hours out of the twenty-four; and, if some part must be covered even during night-time, let that be as small in extent as possible.

It will be inquired, at what time of life, and under what circumstances, recourse should be had to artificial teeth, how much may reasonably be expected of them, and how long they will last? Artificial teeth should be adopted whenever the want of teeth is felt, whenever articulation becomes imperfect, or when mastication can no longer be performed by molar teeth. I say molar teeth, because some persons, when the grinders are lost, masticate with the front teeth, in which case the incisors are soon worn down, or the upper ones are driven outwards and loosened by the action of the lower front teeth upon their posterior surface; and thus they, by being forced into use for a purpose for which they are not fitted, become speedily destroyed.

If the wearer be a person of average perseverance, and average conformation of mouth, he may expect to have articulation perfectly restored, and mastication of ordinary food rendered effective, by using well-designed and well-made artificial teeth.

Then, as regards the durability of artificial teeth. This will vary with individuals, the variation depending on the state of the saliva, the care with which they are cleaned and kept and used, and upon the material used in their construction; also in a great degree on the manner in which they are made, whether ill or well. A well-made set will last out two ill-made sets. One or two teeth on a gold base will last an indefinite time—ten, fifteen, or twenty years, or they may require renewal in two years, their durability depending on the state of the adjoining natural teeth.

Some people will wear a complete set ten years without renewal, while others wear them down in eighteen months. From three to four years is a fair average wear.

The last subject for consideration is the effects of artificial teeth on the natural teeth which remain in the mouth at the time of their adoption.

It is sometimes stated that artificial destroy the natural teeth to which they are attached by bands; but, I think, seldom with truth, unless the adopted teeth are badly constructed, or the wearer is careless about keeping the teeth and mouth in a clean and healthy condition. That teeth encircled by bands occasionally decay is quite true, but they might have decayed had they not been so encircled; and this is the more probable, as the adjoining teeth have already been lost by decay, in nineteen cases out of twenty were artificial teeth are required. Indeed, in estimating the effects of artificial teeth, it must be constantly borne in mind that the natural teeth have shown a predisposition to disease. Of course, this observation does not apply in those cases in which the teeth have been lost by accidental violence; and it is found that, in those instances, the teeth encircled by bands very seldom suffer.

Supposing, however, it were an established fact that teeth around which bands pass for retaining artificial teeth are thereby seriously damaged; yet, in many cases, it would not be inexpedient to employ them. Frequently, the encircled tooth has no other value than that of supporting artificial teeth, on account of the opposing natural tooth of the opposite jaw being

absent: hence it is ineffective as an organ of mastication, and valueless unless used to support or oppose artificial teeth.

But to repeat what I have before stated, mastication is necessary for the maintenance of health. If, therefore, so many of the natural teeth have been lost that it can no longer be efficiently performed, artificial teeth should be adopted, even at the cost of the remaining natural teeth. For when these are lost the artificial ones may be extended, and the patient is not in a worse position than when they remained. But, as I before observed, the use of a partial set of artificial does not necessarily involve the premature loss of the remaining natural teeth. On the contrary, their durability is in many cases very considerably increased.

Having given a general outline of the construction of artificial teeth, together with a more detailed account of those points connected with their management with which it is important that those who are interested, either directly or indirectly, in their use should be made acquainted, I shall conclude the lecture.

ARTICLE XV.

On a Peculiar Form of Malignant Inflammation of the Lips and Face, resembling Malignant Pustule. By W. PARKER, M. D., Professor of Surgery in the College of Physicians and Surgeons, New York.

THERE have come under my observation, within a recent period, several cases of a peculiar form of inflammation of the lips and face, which resembles somewhat phlegmonous erysipelas, but more strikingly, especially in its commencement, malignant pustule, and, in its subsequent progress, carbuncle. It, however, differs from these affections in some essential particulars, which will be noticed after giving the details of the fol-

lowing cases, which illustrate the peculiarity of this form of disease.

Case 1.—I first saw this patient on the 18th of last December. He was a young man, aged 23, merchant, of good character, temperate habits, and in the previous enjoyment of good health. About a week before I visited him, a small pustule made its appearance upon the central portion of the lower lip, just below the edge of the vermilion border. It became painful, had a livid areola, gradually but slowly enlarged, and finally broke and began to discharge. The pain increased, and the swelling extended downwards upon the chin. At my first visit, about this period, the tumefaction had reached as low as the os hyoides, and had extended over the right side of the face to the head; it was hard to the feel, of a livid color, insensible, and had now much the appearance of a carbuncle. The lips were greatly tumefied, everted; gums swollen, and of the same livid color; tongue moist; inside of mouth unaffected; ptyalism considerable. The lower lip, about the seat of the original pustule, appeared gangrenous. The pulse was 120, rapid and feeble, respiration unaffected. He was able to get up and sit in the chair, but was suffering from great depression of the vital powers. The course pursued consisted of deep scarifications of the lips and yeast poultices to the swelling, and stimulants to sustain the general system. The swelling continued to extend, involving successively the neck, face, and finally the head. He died on the following day, the 19th, late in the evening.

Case 2.—I visited, on the 15th of January, a patient, aged 45, merchant, suffering from what appeared to be a carbuncle of the under lip. He was of a good constitution, temperate habits, and in the enjoyment of good health, previously to the present attack. Four days before I saw him, he was supposed to have cut the lower lip slightly, and applied to it arnica. The inflammation commenced at this point, the lip swelled largely, became everted, had a livid color, was tender, hard, and the seat of a burning pain. At several points there were small sloughy apertures, discharging thin pus. The constitu-

tional symptoms were considerable, but not sufficient to confine him to his room. The treatment consisted of free incision and yeast poultices to the lip, and sustaining remedies for the general system. Portions of the lip sloughed, but he recovered.

Case 3.—Mr. W., aged 26, married, furniture dealer, of good habits, and hitherto perfect health, discovered a small pustule on the under lip near the right angle of the mouth, on the 2d of April. It was tender on pressure and had a hard base, but attracted no other attention. During the night the disease extended considerably, involving the whole lip and the right side of the face in a hard, livid, and painful swelling. On the evening of the second day his physician first saw him, and found the lip greatly swollen, of a livid color, and the seat of a burning pain. He scarified the parts for the purpose of local depletion, and also applied leeches. The swelling continued to extend, involving the right side of the neck and face to a great extent. I saw him on the 7th, at 11 A. M. His symptoms were then most unfavorable, pulse 130 per minute, intermittent every seventh or eighth beat, weak and small; respiration rapid, moaning; skin warm and moist; urine free; pupils much dilated; mind clear. He complained of oppression about the chest, and had not been able to obtain sleep. Both lips were involved in the swelling; were hard, livid, and insensible; the whole side of the neck and face was similarly affected, the eye being nearly closed. The frontal vein was livid, red, and prominent, and the veins of the cheek were also visible, as if distended. The treatment consisted of deep scarifications of the lips, and yeast poultices to the part, with anodynes and stimulants. I visited him again at six o'clock, P. M., and found him rapidly failing; treatment of no service. He died the same evening.

Case 4.—I was called, April 10th, to see Miss S., aged 30, occupied as a governess, of good constitution, whom I found laboring under the same difficulty as in the preceding cases. Her history was almost precisely similar. Five days before, while in the possession of apparently perfect health, she first observed a small pustule on the lower lip, just below the red

line of mucous membrane; it was regarded as a small boil, and no attention given to it. On the following day the pustule had enlarged somewhat, was hard, and had a livid areola, but she continued about her employment; she spent a feverish, restless night, and on the next day called her physician. The disease gradually extended, assuming the appearances already noticed, and for two days no danger was apprehended. Her symptoms now became much more unfavorable, and at this period I first saw her. She was lying in bed quite insensible; deglutition difficult; respiration laborious; right side of the body paralyzed; lips large, everted, and cold; right side of face, neck, and forehead swollen like the lip, hard and purple; right eye protruded; pupils dilated and insensible. On making an incision into the lip, the cellular substance was found filled with small deposits of pus, which were forced out on slight pressure. As she was moribund, treatment was of no avail.

From the history of the foregoing cases, it is evident that this disease differs from erysipelas, for which it has in several instances been mistaken, in its origin in a pustule, without a chill or other constitutional disturbance, the hardness of the swelling, its purple or livid color, insensibility, and absence of much pain. It differs from carbuncle, which in some features it resembles in the class of individuals which it attacks—they being young, temperate, of sound constitution, and in the previous enjoyment of good health—and in its rapidly fatal course. Carbuncle, on the contrary, oçcurs by preference in persons enfeebled by age or vicious habits. It differs again from true malignant pustule, to which, in its origin, it seems allied, by attacking persons who have not been affected by poisonous wounds, or who have been liable to the introduction of animal poisons into the system.

This disease would therefore seem to be peculiar, having many points of resemblance to other similar affections, but still not so closely allied to any one as to warrant its classification under the same head. In every instance which has come under my own observation, the pustule has been seated upon the lower lip, and from this point the inflammation has spread. In a fatal

case related to me by a physician, in whose practice it recently occurred, the pustule was seated upon the side of the nose.

Although the nature and progress of the disease show a vitiated state of the system, in no instance have I been able to trace the attack to the contact of poisonous matter, or its reception into the system in the food or drink. In every instance the patient has been in the enjoyment of good health, and the progress of the disease, though rapid, has excited so little local and general disturbance as not to excite alarm until a short time before its fatal termination. The general symptoms are of a typhoid character, the vital powers being evidently depressed either by the influence of the disease itself, or, which is more probable, the cause upon which the development of the disease depends.

The late Dr. Peirson, of Salem, Mass., reported (*Bost. Med. and Surg. Jour.*, 1852,) several cases very similar to the above, and considers the disease malignant pustule. Among them is the case of Hon. Robert Rantoul, whose disease was thought to be erysipelas, but which Dr. Peirson describes as malignant pustule. The pustule in this instance was situated upon the forehead, and depended upon no known local cause. With but one or two exceptions, the remaining cases in this paper occurred in curriers, and hence Dr. Peirson attributes the disease to inoculation with dead animal matter. Some of them bear a strong resemblance to the cases above related, the disease attacking the lips of healthy young persons, entirely unexposed, and spreading thence upon the face. These can scarcely be classified under the head of malignant pustule as described by authors. Bayle speaks of a form not depending upon external cause, but this distinction is not generally received.

The success of the treatment depends upon the *early* recognition of the true nature of the disease. It is very liable to be mistaken for erysipelas, and a course of treatment adopted accordingly, which avails little in staying its progress. Attention to the points of a differential diagnosis already given, will prevent the practitioner from falling into this error. The treatment best adapted to meet the indications of the case, are deep

and free scarifications, followed by yeast poultices, or turpentine, the object being to prevent sloughing and to promote healthy suppuration. The general system requires soothing and sustaining remedies, such as are suited to an ataxic condition. The early and prompt employment of these means will afford a fair, and probably the only, hope of success in the treatment of this disease.

My object in this communication is to call special attention to this disease, which, from the frequency of its occurrence in my own practice, and other cases which have been related to me, seems to be very prevalent. The points of particular interest are in regard to its causes and pathology. Does it depend upon an endemic or epidemic cause, or upon the introduction of animal poison into the system? Is there phlebitis as a cause or consequence? These questions are important, and can only be settled by careful observation made upon the living and dead subject.—*N. Y. Jour. of Medicine.*

ARTICLE XVI.

Dental Education. By J. S. ROCK, M. D., Dentist.

THE importance of a liberal education to the practicing dentist, is a subject which we think has been too much overlooked by the profession. Every intelligent person is ready to admit that all professional men should be liberally educated—while the dentist, an exception to the rule, if he has learned a few technical terms from some anatomical work, possesses the strength of a blacksmith, the mechanical ingenuity of a tinker, and a flippant tongue, goes forth with a few "specimens" (made by some journeyman,) as a scientific dentist, when, in fact, he cannot distinguish between the normal and abnormal condition of the tissues, and in the majority of cases, if called upon, could not discriminate between neuralgia and odontalgia.

Dentistry has always been too much looked upon as a trade, in which mechanical talent is alone called into action, and only a moderate share of that; the result is, too many have been induced to enter into it with the (vain) hope of learning all there is to be learned in a few months, at a trifling expense, with the expectation of a fortune in a short time. This ambitious desire to make money, at the expense of life, or limb, or both, is much to be deprecated. A man who has no higher motive than money-making, is unfit to be placed in so responsible a position as that of a dentist or a physician.

We have dental societies and colleges now, and we expect to see, ere long, a distinction between the scientific dentist, and the semi-ignorant practitioner. It will take time, patience and perseverance, on the part of the profession to accomplish this end, and these institutions will do much to forward it; able men are in the work, and it must succeed. Then, and not till then, will dentistry be exalted to that position which the scientific portion of the profession are aiming for, and which it is destined sooner or later to attain.

Our plan is, that young men, before entering the profession, shall finish their English and classical education; for we assure them that a sound classical education will open stores of learning to them, which are sealed books to others. Technical terms abound very luxuriantly in the different branches of our science, and these have nearly all been derived from the classics. Their acquisition is always a matter of difficulty to the English scholar, but that difficulty is much lessened if the student is familar with the Latin and Greek. They will find that there is a great deal to be learned from the ancient authors, far more than enough to encourage them to read them in their original tongues.

There are many valuable works written on surgery, chemistry and dentistry, by the French and Germans, and we lose much valuable information if we are unable to read these languages. A general knowledge of the sciences is of great importance to the dental surgeon, and will furnish him with invaluable assistance in diagnosing. The object of all science is to discover facts and trace their relations; and unless we are acquainted

with them, our judgment must be limited. They strengthen our minds and enable us to determine what any series of effects and causes will have upon each other, which is our great duty in investigating the cause of disease, and the application of the remedy.

We should also gain by every means an accurate knowledge of facts, and enlarge their number to the utmost possible extent; and beyond this, we should strive to obtain a habit of discerning the dependence of facts upon each other, and the whole upon general principles.

The mechanics of the human body is a subject of great interest, and will furnish the most perfect models for imitation; the varied action of the muscles are in harmony with the action of levers universally, for these laws have been deduced from the operations of nature, of which we have the most perfect illustration.

The science of acoustics is an invaluable aid to us in the physical examination of the lungs, heart, &c., and we now look to that science to resolve certain doubts which still envelop the subject.

Optics is another important aid. The benefits resulting from the use of the microscope in the study of anatomy and physiology, and the practice of medicine, is truly astonishing. A distinguished London surgeon says, "the smallest portion of a diseased structure, placed on the field of the microscope, will tell more to the experienced eye in one minute, than could be acquired from a week's examination of the crude mass of disease, as preserved in any museum." The same may be said of other branches of science.

The different temperaments, habits and modes of living are objects of vast importance, and should be well understood. The same medicine will often produce different effects upon different constitutions. *Exegesis*, the administration of an emetic in one constitution will produce free emesis, while in another it may produce violent cramp in the stomach. Again, a cathartic given on an empty stomach will generally purge freely, but if given after a full meal will arrest digestion, and often produce

nausea and vomiting. A slight wound in one person may heal by the first intention, while in another it may result in traumaic tetanus and death!

A general knowledge of the different branches of medical science is of infinite importance to the dentist, and without it he may not expect to excel. The sciences of medicine and dentistry are so intimately connected with each other, that to separate the one from the other is to clip the branches from the trunk. The treatment of all diseases of the mouth, and the performance of all operations in that cavity, belong peculiarly to the dental surgeon; but if he is ignorant of said branches, it would be extremely dangerous for him to operate for a cleft palate, to extract a tumor, or to excise a superior or inferior maxilla, especially when we consider the difficulties which attend these operations, and the many vital structures which it is necessary to divide. But why call ourselves dental surgeons, if unable to perform a greater operation than the extraction of a tooth or a scarifying of the gums? If our knowledge in surgery extends no farther than this, it is very little if any superior to blacksmiths and barbers, who occasionally do the same.

We should also strive to obtain a thorough knowledge of physiological and morbid anatomy, so as to be able to diagnose correctly. We should examine the disease as far as needful for our purpose, and extend our views as far as possible to every thing that has a connection with it. There are many advantages to be derived from it.

1. It will be the means of suggesting to our minds the true nature of the disease.

2. It will enable us to solve any difficulties which may present themselves in its treatment.

3. From our thorough knowledge of the disease, we will be better prepared to treat it according to the principles of our art.

This habit of conceiving clearly and diagnosing correctly, is not to be learned from any set of rules, though these will assist and place us on the right track; but it is observation and practice which must form and establish this habit. We can then,

as it were, with ease, grapple with any disease which may present itself, our minds will soon become offended with obscurity and confusion, and restrained from rash judgment. If we adopt this course, we shall treat cases with credit to ourselves, and satisfaction to our patients. Being posted up in every branch directly or indirectly connected with our profession, we shall be prepared to resort to every expedient that science has placed in our hands; and when we fail in any case, shall have the satisfaction of knowing that we have done *all that could be done.*

Every practitioner is aware that in many cases in which he is called upon to prescribe, he has no precedent. In such cases, the skillful practitioner is seldom at a loss; he knows what is dangerous and what is not, what the constitution will bear and what it will not, and governs himself accordingly.

The man who treats symptoms, as such, is an empiric; while the one who labors to remove the cause is a philosopher. The one noticing pain in the head and face, immediately prescribes for neuralgia, while the other patiently challenges every part of the constitution to discover latent inflammation or local irritation, and having found it, proceeds at once to remove it—knowing full well that the effects may be expected to subside, when the cause has been removed. The former is perfectly satisfied that pain and soreness in a sound tooth result from exostosis, and proceeds at once to extract it; while the latter, diligently seeking the cause, ascertains the pain to be sympathetic, and arising from a gravid state of the uterus. This habit is necessary at every step of our professional career. And not even in the simplest cases can we efficiently discharge our duties to our patient and ourselves without it. It is the very basis on which the practice of our art rests. The cultivation of it is raising our profession to the dignity of a noble art; the absence of it would reduce us to the position of charlatans.—*Boston Med. and Surg. Jour.*

ARTICLE XVII.

On a "Black Fur on the Tongue." By Dr. Eulenberg, of Coblenz. Abstracted from the 'Arch. f. Physiol. Heilk.,' August, 1853.

The author relates, that in the preceding year a child, two years old, was brought to him, whose tongue was covered with a perfectly black coating. The organ, from the tip to the back, appeared as if it were smeared with ink; and at first sight, the supposition necessarily entertained was, that the child had licked some black object, or had swallowed a colored liquid. Except a slight diarrhœa, the boy presented no other morbid symptoms. For his age, he was well developed, and had never had any important illness. The author's immediate treatment was confined to washing the tongue with vinegar and water.

Fourteen days afterwards, the child was again brought to him, when the mother stated that the washing of the tongue had removed the black color only for a short time, at most for not more than a day, when it returned with the same intensity as at first. Dr. Eulenberg prescribed some indifferent medicines, in order to keep the child under observation; directing the continued use of vinegar and water as an external application. But, notwithstanding the diarrhœa had long ceased, the tongue remained the same for three months. When the organ was cleansed, the black color reappeared, first in the middle and anterior half, afterwards gradually covering the entire dorsum of the tongue, and extending as far as could be seen. The *lingual papillæ* were, at the same time, much developed. The *papillæ filiformes* were very distinct, and were especially dark colored. The *papillæ vallatæ*, projecting in a conical form, presented, particularly at their apices, a deep-black covering. Even after the tongue was washed these *papillæ* retained the color, and were merely surrounded by a pale border, owing to

which the black hue of the apex was rendered the more striking. If the colored tongue was scraped, a viscid brownish mucus was obtained, which, under the microscope, exhibited a large quantity of thickened epithelial cells and granular pigment.

If the mucus thus scraped off were dried upon paper, there remained extremely delicate black or dark brown filaments, about as thick as a fine hair, and from $\frac{1}{4}$ to $\frac{1}{2}'''$ in length, or minute irregular plates of the same length and breadth. If the latter were divided, they frequently afforded minute, crisped particles, like fine down. Particles of the same kind, however, were often met with independently. Their elasticity was evidenced in this, that they often sprung away when an attempt was made further to subdivide them with needles.

Under the microscope they represented distinct, very much thickened, and brownish colored epithelium scales, among which, in the less dark, but somewhat transparent places, the pigment granules could be remarked. The latter, however, presented themselves with especial distinctness at the edges of the epithelium scales, and appeared as irregular, rounded, flat granules, the border of which was dark, and the centre always clearer, but no nucleus was ever remarked in them. In the centre of the epithelium scales they occasionally constituted a beautiful mosaic area of rounded, closely approximated, elongated, or sub-angular granules. Punctiform granules were more rarely met with. The moniliform arrangement of the granules was remarked more especially at the border of the epithelium scales. The more transparent the epithelium, the more transparent, also, were the separate granules which then occurred isolated. The author seldom noticed a single isolated granule, for, however few might be connected together, they were usually supported on a small particle of an epithelium cell. When free, they were rounded or punctiform, and appeared connected in the form of a small rod or coronal. This description of the granular pigment does not agree, in all respects, with those given by other authors, as J. Vogel and Höfle. According to Vogel ('Path. Anat.,' p. 159,) it consists of fine granular molecules of a brown or black color, which are

most usually contained in cells of various form and size. Occasionally, it would appear, these pigment molecules occur free, particularly in the parenchyma of melanotic lungs. According to Höfle (Chemie *v.* Mikroskopie, p. 274,) the pigment corpuscles are characterized by the intense black color and almost immeasurable smallness of the constituent granules. According to him, they would seem never to be surrounded by a membrane, but frequently encompassed by a homogenous cortex, not differing from the substance connecting the granules together. Henle (Allg. Anat., p. 282,) is more inclined to the assumption of the cellular nature of the pigment corpuscles, as Schwann states that he has noticed a molecular motion of the pigment corpuscles within the cell, which Höfle, on the other hand, declares to be impossible, since molecular corpuscles can never perform any movements within a gelatinous substance.

In the case now in question, the author never observed a cell or membrane, since the pigment corpuscles rarely occurred in the free state, but were almost always deposited on, or among the epithelium. They most resembled the pigment corpuscles figured by Henle (l. c., tab. i., fig. 12, D.,) in which, also, the border is dark and the centre somewhat clearer. According to him they are 0.0005-0.0007‴ in the longest diameter, and about 1-4th as thick as long. Under a stronger power, Henle also noticed some as transparent as water. On some occasions, the author observed, on the borders of the epithelial scales, and connected with them, elastic fibres, distinctly characterized by their dichotomous mode of division. A few times he noticed filaments lying quite isolated, which very closely resembled the thallus-filaments figured by Henle (l. c., note, p. 29.) They were never connected with the epithelial cells, and exhibited perfectly cylindrical canals, without transverse septa, and beset externally with black points. The latter were in no case pigment corpuscles, as they were globular, which was particularly evident in the granules situated on the external borders, whilst the pigment granules were always flattened, however small they might be. Even in the almost punctiform pigment granules, the darker border could be distinguished under favorable con-

ditions of illumination. It is well known that the granular pigment, besides its normal deposition in the *corpus ciliare*, in the pulmonary tissue, in the integuments, &c., is, for the most part, presented only in the most various pathological structures. In the tongue it has not yet been met with, especially to the extent in which it occurred in the present case. Höfle (l. c., p. 59,) observed in five cases, in the fur of the tongue occurring in the healthy condition, dark brownish bodies, partly of a cylindrical, partly of an irregular form, and with three or four times the circumference of the largest epithelial scales, thickly beset with granules, and internally containing a sort of medullary body. He regarded this as an epithelial investment of the lingual papillæ. These cases would seem to present no similarity with the instance observed by the author. Höfle could never effect a division of these bodies into separate epithelial scales, which Dr. Eulenberg could always succeed in doing; nor could the latter ever observe the so-called medullary body; and, as regards the granules, Höfle describes them as black, scattered points, whilst in the author's case, they were aggregated in many ways, and represented roundish or angular and flattened granules or plates, with dark borders, and, much more rarely, simple points. The dark epithelial scales upon which the pigment corpuscles were chiefly deposited, the author also regards as an epithelial covering of the *papillæ.*

After he had observed the progress of the case for a sufficient length of time, and found that the phenomena remained unchanged, the author directed the internal use of an aqueous solution of chlorine, to be administered every three hours. After about two ounces of this medicament had been thus taken, not a vestige of the black coloration remained. The tongue had resumed its normal appearance, and the *papillæ* more of their natural size. The color had not recurred, even at the end of a year, so that the cure seemed to be complete.—*London Quar. Jour. of Mic. Science.*

ARTICLE XVIII.

Memoirs on a Few Fundamental Points of Dental Medicine, considered in its Application to Hygiene and Therapeutics. By A. F. Talma, M. D., Dentist to the King of Belgium, &c. Translated by C. A. Du Bouchet, M. D., D. D. S. First Series. Brussels, 1852.

Cares relating to Second Dentition.—The defective arrangements of teeth are usually limited to incisors and canines. It is more rare to find bicuspids out of range. As regards molars, although assuming almost always an internal oblique direction, they straighten as the alveolar borders enlarge, and also under the influence of the eccentric pressure acting upon them.

As a general thing, the irregularity of one tooth causes that of several others in the same arch, and likewise in the opposite jaw. Thus, an incisor inverted or everted, or merely twisted on its axis, will cause its neighbor to incline towards it in an opposite position, and thus the deformity may affect all the front teeth. On the other part, the corresponding teeth of the opposite jaw being subjected to abnormal pressure during mastication, and the occlusion of the mouth, depart almost necessarily, from their regular position. From this *ensemble* of influences result combinations varying ad infinitum, all assuming the type of more or less shocking deformities, interfering with the due performance of functions and predisposing to the premature loss of the very teeth themselves.

Among the cares to be bestowed, during the second dentition, upon the arrangement of permanent teeth, the extraction of deciduous or milk teeth is that which taxes most parents and dentists. It then appears obvious that, in order that the tooth of replacement may have room to assume its proper position, that nothing better could be done than to prepare that room in advance. But reason, and especially experience, modifying

much this too hasty conclusion, two difficulties must at this juncture be carefully guarded against. The one consists in too early an extraction of the deciduous teeth, the other, in allowing them to remain beyond the necessary period.*

Experience and a considerate appreciation of the conditions of the dental system, can alone prevent the errors I have just pointed out, and fix the truly proper time for operating. I have ascertained that more frequent and serious irregularities are caused by too early extraction, than by the opposite course. The deformities produced on account of having allowed deciduous teeth to remain too long a time in their situation, very frequently correct themselves, from the very growth and enlargement of the alveolar arch and of the whole maxillary. We should never forget that the crowns of teeth after their eruption no longer increase in size, while the bone which supports them remains for several years subject to the laws of development of the entire system. Whence there results—that at the end of a certain time, some teeth which appeared never to be able to find sufficient room, finally arrange themselves in the most perfect order, much to the astonishment of parents and often dentists themselves. When, in the cases, which I believe more scarce and resulting from special dispositions, the deformity is more considerable and appears to have a tendency to become permanent, we can still avert it by such operations as I shall point out subsequently. We shall find that in almost every case we can remedy the difficulty, while the exaggerated separation of the teeth, or the loss of those which have been sacrificed, ordinary results of an opposite practice, usually leave no resource.

As a consequence of these principles, deciduous molars, even carious and painful, should not be extracted before the age of eight or nine, unless, in consequence of this condition of things, the health of the child should be positively disturbed. Heretofore, I have much applauded myself for temporizing, and

*We omit here the enumeration of cases illustrating the views of the author, in regard to the proper indications for extracting deciduous teeth, as they are fully summed up in the paragraphs which will follow. D. B.

having recourse to palliatives, local applications, sometimes plugging, or even cauterization. When the crown of those teeth has at last yielded to decay and has gradually broken entirely off, I still deem it useful to respect their roots. Their premature extraction would allow the first permanent molars appearing from the sixth to the seventh year, to encroach upon the room they occupy; so that the bicuspids in their turn should, in order to find room, crowd forward as far as the lateral incisors, thus excluding the canine teeth from the circle. In such cases canine teeth have often been sacrificed by too thoughtless practitioners; such mutilations should ever be avoided. We may indeed be at times compelled to extract a sound permanent tooth, but let not that be a canine, let us choose the bicuspid—the canine tooth will soon assume its proper place.

To sum up, a long practice has demonstrated to me that the dentist, as far as regards operations to be performed upon deciduous teeth, should observe the following rules as the most rational and the safest.

1st. So long as deciduous teeth remain firm, even when they begin to become loose, if no indication heralds the near apparition of the permanent teeth, nature should be abandoned to itself; there is no call for interference. The dentist is authorized to extract a deciduous tooth only when it has become so loose as to seem ready to drop out, and when a slight effort is sufficient to detach it.

2d. When in front of, or behind a milk tooth still firm or already loosened, appears a circumscribed reddish, somewhat painful tumefaction, under which a projecting hard body may sometimes be felt, it is proper to extract that tooth. That is the best means to prevent the deviation of the tooth endeavoring to come out. Consequently, if that tooth has already pierced the gum, we should perform the extraction so as to allow it to fall in the line before the deviation becomes more considerable, presents more difficulty to be corrected.

3d. If one of the permanent teeth does not find in the space left by the deciduous one, room enough to locate itself properly,

and in consequence of want of room begins to deviate, we may extract the contiguous milk tooth. But, far from hurrying to perform this operation, it should be retarded until the necessity for it be clearly demonstrated, and generally until one-half of the crown of the new tooth has pushed through the gum. It is only at this time that this tooth has exercised all its expansive force, that its position is certain, and that the removal of the contiguous deciduous tooth can be but advantageous.

These operations should follow the progress of the eruption of the teeth, beginning at the central incisors, and following with the lateral incisors and canines.

4th. In certain cases, after having sacrificed, accordingly with that which precede the deciduous canine to make room for the permanent lateral incisor, we may be obliged still to extract the first bicuspid which appears at nine years, to make room for the canine which comes at eleven. But it sometimes happens in opposition to the general rule, that the canine tooth erupts before the bicuspid; we should in this case extract the first deciduous molar. These operations should be performed as soon as the necessity for them is ascertained, because, as I have already stated, we have nothing to gain by waiting, and also because the extraction of those teeth is the easier as their roots are less fully developed.

5th. We meet, rather frequently, with children whose canines are well set but have appeared before the first bicuspid; in such cases the lateral incisor not finding room enough in the arch, deviates anteriorly or posteriorly; its extraction then becomes indispensable. The ulterior arrangement may be left to nature, which will direct the other teeth towards the vacancy, and thus fill up the breach.

During the whole period of life,* teeth have a manifest tendency to progress forward; and this tendency may, in many circumstances, be turned to good account, in regulating their arrangement. Especially, when a case similar to that which we have just mentioned is met with in the lower maxillary, my

* This fact seems to us well worthy to be borne in mind, as in many cases great advantage may be derived from it. D. B.

rule is always to extract the most anterior incisor, even if properly set. Its removal is less difficult and painful than that of the other, which, by the action of the tongue or with the aid of some of the arrangements mentioned in the following memoir, will assume the place of the extracted one.

6th. The final period of dentition, the eruption of the last permanent molars or dentes sapientiæ, frequently calls the attention of the dentist, and claims his assistance. It sometimes happens, especially in subjects who have passed the normal epoch for the cutting of those teeth, that their place being invaded by the second molars, they find no room to arrange themselves. This obstacle is more frequent in the inferior than in the upper maxillary, on account of the coronoid apophysis forming at the extremity of the arch or bony boundary, which will not yield. Held back within the thickness of the bone, and endeavoring to escape from their place of concealment, the wisdom teeth under such circumstances are apt to cause dull, deep-seated pains radiating over the entire side of the dental arch, reaching the auricular and temporal regions and even extending to the whole side of the head and face, keeping up a continual state of suffering and irritation, ultimately felt by the general system and impairing the health of the patient. Almost invariably this state of things is attributed to any but the real cause, and the physician himself, when called in, frequently neglects the examination of parts, and is prone to attribute to the general and confused influences of cold, dampness, rheumatic tendency, and various neuralgic affections, the origin and persistency of the morbid phenomena presented.

The principal, and we may say, the only difficulty in such a case consists in making a correct diagnosis. Ascertaining the number of teeth, the original seat of pain, its vague character, its irregular nocturnal exacerbations, are so many circumstances which will assist the dentist. If, upon touching the gum behind the second molar, we find a particularly painful spot and considerable swelling, the gum should be deeply incised, and a probe inserted in the wound to feel the crown of the tooth endeavoring to cut its way through. The subsequent

treatment must vary as either of the three following cases shall occur.

If the tooth seems to have room for its development and has only been retarded by the toughness or the thickness of the integuments, the exploring incision should be enlarged, made crucial, a fragment of the gum over it may be cut out—nothing further need be done—time will effect the cure.

If the wisdom tooth cannot be accommodated between the second molar and the coronoid apophysis, it must be extracted if accessibe to instruments.

Finally, if the wisdom tooth is not accessible to instruments, the second molar must be extracted; its place will soon be filled up by the new tooth. Generally, rational practice is also here preservative practice, to save both teeth if their position permits; in the contrary case, prefer to remove the dentes sapientiæ, which, more frequently than the second molar, is liable to caries, and always less solid and less useful to mastication; such is the rule to be followed.

I cannot repeat too often a counsel justified by the preceding remarks: the mouth of children should be, during the period of second dentition, examined regularly at suitable intervals by a skillful dentist, who alone can appreciate the progress of dental eruption and rectify its irregularities at the proper time.—*Dental News Letter.*

ARTICLE XIX.

Poisonous Effects of Soda Water from Copper Fountains and Lead Pipes. By R. OGDEN DOREMUS, M. D.

HAVING, within a few days, had several friends relate their sudden illness after taking a single glass of soda water, and suspecting some poisonous impregnation to be the cause, I was induced to obtain several gallons of this favorite beverage, from

different parts of the city, and to submit them to a chemical examination.

The substance which first attracted attention was *copper*.

This was very abundant in soda water obtained from several obscure shops, where it was presumed the traffic was limited, and consequently the acid water remained longer in the copper condensers. It was so evident that, on boiling off the excess of carbonic acid gas, a green scum made its appearance, which, on further evaporation, settled. This was carbonate of copper, previously held in solution by the carbonic acid.

The amount of metallic copper in a quart was one grain and a half!

Soda water obtained from the same establishment on different days, was found to contain varying amounts of poisonous carbonate.

The source of this copper, and the cause of these differences, may be accounted for in several ways.

The copper condensers purport to be tinned internally; but where they have been in use a long time, the tin, by chemical and mechanical action, has been removed, at least in part; thus exposing a surface of copper to the corrosive action of the carbonic acid, aided by sulphuric acid, which is occasionally found in the soda water.

Although the carbonate of copper is insoluble in *pure* water, it is capable of being held in solution in water highly charged with carbonic acid gas; for the soda water which yields this green scum after discharging the gas, is clear and colorless previous to the operation.

The soda water drawn shortly after charging the condenser, would necessarily yield less copper, on analysis, than that obtained from the same fount after having several days to exert its corrosive influence. Again, the tinning (for all are professedly thus lined) would be more perfect in some than in others—dependent not only on the length of time the condensers had been used, but also on the completeness of the original coating. I have been informed that, in order to facilitate the flow of the tin, soft solder is at times resorted to, or the copper is washed

with a salt of mercury. Under these circumstances, the chemical and electrical action would be rather complicated, and the soda water possessed of remarkable *medicinal virtues.*

The second poisonous compound which, from its abundance, demanded investigation, was a white precipitate, the carbonate of lead. This was found, to a greater or less amount, in most of the waters examined.

In the quart whence the grain and a half of copper was obtained, 0.65 of a grain of metallic lead was found.

The chief source of this impregnation is the lead pipe used in many fountains to convey the carbonated water from the condensers to the jet.

It is an established fact, that the free carbonic acid found in spring waters is capable of dissolving or facilitating the solution of many of the salts of lead, such as are found encrusting lead pipes which have been used for conducting said waters.

By the investigations of Dr. Ellet, published in this city last year, it was clearly shown that even the trivial amount of carbonic acid found in Croton water is sufficient to act upon the lead pipes.

This lead may be readily found in any kettle which has been used for boiling the Croton water passed through a lead pipe, by adding a little acetic acid to it. The acetate of lead will respond to sulphureted hydrogen, by assuming a black tint (the sulphuret of lead,) or a yellow tint with the iodide of potassium, &c.

Since carbonic acid is possessed of such solvent powers, soda water, which is surcharged with it, must become poisonously contaminated by contact with lead, either in the pipes or the soldering; and as much of the tin of commerce is alloyed with lead, even this metal, to which we look for protection, may be another source of evil.

Many are impressed with the belief that the first few glasses may be impregnated with lead to an injurious extent; and hence the custom, in the most respectable establishments, of discarding the soda water which is first drawn, and has lain in the tube over-night.

Wherever lead pipes are used to conduct the water to the jet, and especially where, in order to secure a cool draught, from thirty to sixty feet of lead pipe are coiled in a tank and covered with ice, the highly acid liquid must necessarily dissolve the metal, and communicate the poison to all contained within the condenser.

These remarks are not applicable to pipes of pure tin, or of lead properly coated with tin.

I have examined the soda water obtained from a manufactory where it is bottled, but could discover neither copper nor lead.

The effervescent liquid which is at times "palmed off" upon the public, made by forcing atmospheric air into water (most truly, "aërated water,") would, from the very want of the carbonic acid, be nearly free from those contaminations.

It might be asked, "if these poisonous bodies exist in soda water, why are not the effects more commonly known?" I would reply, they are more generally known than is supposed.

Since commencing these investigations, I have learned from several medical friends, that a coppery taste, violent vomiting, colic pains, purging, &c., have not been uncommon results from such draughts; and most with whom I have conversed have experienced these effects personally.

In Dr. Mitchell's Therapeutics mention is made that soda water from old copper fountains is strongly marked with the copper taste.

My assistant informs me that five years since, while in a drug store, he observed that vomiting and other symptoms of poisoning by copper followed frequently after drinking soda water, and that many thought it was cholera; and after being similarly affected himself, he tested the water and found copper.

I am informed by a resident of St. Louis, that while the cholera prevailed, most persons abandoned the use of soda water; it was a common remark, "Mr. —— took a glass of soda water, and was immediately attacked with cholera."

Probably the syrups which are the usual accompaniments of the soda draught, act in many cases as an antidote; for although the efficacy of sugar in this respect, as originally proposed by

Duval, was denied by Orfila, it has lately been reasserted by Postel.

I regret that, for want of time, I have not been able to complete other experiments on this subject; yet, as I am convinced that in many cases this poisoned soda water has proved the exciting cause of cholera in those predisposed to this disease, and in others, that it has by its inherent properties been injurious to health or destructive to life; and as at this time the cholera question is again agitating the public mind, I have thought it advisable to relate the results of this partial investigation.

With the knowledge of these facts, we may conclude that although soda water may be retained in a *well-tinned* copper condenser, and discharged through a *thoroughly-tinned* lead pipe, without poisonous impregnation; yet, as any imperfection in the tinning of either, or long or careless usage, may expose the copper or the lead (or both) to the solvent powers of this carbonic acid, and thus render the beverage dangerous, therefore, these vessels should be discarded or only permitted in the hands of trustworthy persons.

Condensers of stone, of iron, or of the purest block tin supported by iron bands, or of gutta percha, aided in a similar manner, would be free from poisonous impregnation. Conducting pipes of these latter materials are likewise unobjectionable.

In another paper I shall present the results of more extended investigations, and shall be indebted to any physicians or pharmaceutists who feel disposed to assist in this work of common interest, by favoring me with reports of cases, or samples of suspected liquid for analysis. If those engaged in the fabrication of this article would afford an opportunity of examining some of the old soda fountains, it might aid materially, and perhaps result in the suggestion of better methods of protection.—*New York Med. Gazette.*

QUARTERLY SUMMARY.

DENTAL SCIENCE.

1.—*A new Non-conductor for Capping Dental Nerves or Tender Teeth.*—In the Dental News Letter for April, 1854, Dr. C. A. Du Bouchet says: "With a view to obviate the evils arising from filling a tooth over an exposed nerve, or in a tender state, various operations have been devised and performed. The operation of capping the nerve of a tooth was, I believe, prior to that of destroying it; of course I now allude to the ancient procedure of the actual cautery. Capping nerves has never, as far as I can ascertain, proved an eminently successful operation. This want of success, attributable to a variety of causes, (to which I shall presently allude,) gave rise to the employment of caustics and escharotics to cause the death of that troublesome subject."

Arsenious acid then came into use—but as this was yet involved in darkness, the use of that agent and the subsequent treatment, did not meet the requirements of the case, and thus the failures being numerous, compelled the practitioner to abandon it for the time. The doctor then remarks, that the profound researches of contemporaries, and successful experiments, have entirely settled this point, and that it is generally believed we know how to use arsenious acid; that we know the dead pulp should be removed, and a time elapse ere we fill a tooth; but in this we have lost sight of the opposite operation, of preserving an exposed nerve in a *healthy condition.*

The doctor states, that on this point he occupies no half condition—that he has no faith in the operation which will merely allow a tooth to stay in the mouth. He then proposes to present to the profession one *new substance*, which, to his knowledge, has never been used for this purpose. He believes that the cases are unfrequent where capping would be advisable; that if a nerve became exposed by the decay of a tooth, or has seriously been wounded in excavating a carious tooth, it were worse than useless to attempt capping in any uncertain cases, and that he prefers to follow Prof.

White's indications for the use of arsenic. Dr. Du B. here gives cases where capping is advisable; he also shows to what causes the want of success is attributable, and he is satisfied, that although the difficulties are great, if the operation were performed in any of the cases he points out as practiced by him, that it will be successful in ninety-nine cases out of a hundred. Dr. Du B., after showing the inexpediency of any of the materials used for capping nerves, viz. gold, lead, the different gums, asbestos, pulverized glass, feldspar, plaster of paris, &c., but found that none of them were so well calculated to fulfil the requirements as *horn*. It can be pared to any size—can be obtained of any hue; it is a good non-conductor, and is indestructible. He says the horn can be used to great advantage in filling front teeth where they are decayed to a shell, by placing a thin plate against the front enamel, the natural color is preserved. In remarking upon the paper of Dr. Du Bouchet, the editor of the News Letter says:

"The above intelligent paper is of much interest to the profession, from the fact that the author seems to have given it great attention for many years; and especially to those who believe it is sound or good practice to endeavor to save an exposed pulp alive. Medicating an exposed pulp, and capping or arching it over, in order to prevent the actual contact of external agents, seems to have been, until of late years, the principal means depended upon to obtain so desirable an end; but this method of treatment has given way to apparently a very different theory and practice. *Non-conductors* and non-metallic substances, seem now to be relied on entirely. Many in the profession are doubtless familiar with most of the substances named, and each one, in their turn, have had their advocates. But horn and shell seem, and very justly, to be preferred by the author, and which is favorably brought before the profession. It will take the shape of the bottom of the cavity much better, we have no doubt, than many other articles used heretofore, especially if it be prepared as directed, and is as good, if not a better non-conductor, than any other substance named, that is as close in texture. The profession had been apprised for some time, by one of two eminent practitioners, that they were experimenting with a substance which, if placed between the plugging material and the exposed pulp, there would be no danger of unpleasant consequences, and which experiments, when perfected or completed, or satisfactory to them, would be communicated to the profession. We wait-

ed patiently for the revelation of *Goose-Quill*, and by some apparently informal manner, it became known to many of the profession, but not as yet in that desirable form that could be wished, for the credit of the original claimant of the suggestion of the substance. It does not seem to us that the question turns upon the difference between the capacities of these different substances to resist the changes of temperature; but upon the pathological condition of the pulp, when actually exposed, it does not seem possible that any foreign substance can take the place in any degree of a normal tissue, especially to be in close contact with so impressible a tissue as a dental pulp. We have said elsewhere, and we have as yet observed nothing to cause us to change our position, that as well might we expect to procure a healthy function of the *rete mucosum*, when denuded of the *epidermis*, by substituting one of our own invention, as to procure a healthy function of the pulp when deprived of its natural protection—the bone. The various modes of treatment which have for their object the preservation of the pulp, must be of that order. We regard the propriety of capping an entirely exposed nerve as already settled, and the intervention of any substance to cut off the effects of external influence of any agents differing from the material used as a plug, as of questionable propriety. The uncomfortable impression of cold upon a tooth where there is a due amount of dentine to keep up a healthy function of the pulp, is always of short duration, and when that has passed off, the tooth is in a better condition, plugged with one material, than with more and of different characters. And where the remaining plate of dentine is extremely thin, it is as liable to be absorbed or to go on to soften, as to become hardened or increase in thickness."

2.—*A Freak of Nature.*—A writer in the News Letter for April, 1854, signing himself H., mentions a case in which, upon opening an enlargement of the palatine surface in the mouth of a lady aged fifty, discovered a beautiful canine tooth. "The peculiar position," he says, "was an inch and a half from the alveolar border, five or six lines to the right of the mesial line, and presenting from within outwards, so that a pair of straight, narrow beaked forceps, was employed for its removal."

3.—*Crystallized and Sponge Gold.*—Dr. C. W. Ballard, in addressing the editors of the News Letter, in the last April number, upon the subject of *crystallized and sponge gold,* says, "I wish, through the columns of your journal, to call the attention of the profession to the preparations of crystallized and sponge gold lately introduced for the purpose of filling teeth. I have been for some months testing and experimenting with them, and from the results, think myself warranted in recommending the new preparations, as being of the utmost importance to the operating dentist.

The same force will make a harder and more solid filling of it than if gold foil were used. Its plasticity enables the operator to fill shallow or saucer-shaped cavities with greater ease, thus doing away, in a great measure, with the necessity of removing sound dentine or enamel, in order to find a sufficient hold or stay for the ordinary filling. This I consider of great importance, as it leaves so much more of the natural organs; in fact, there is just as much more of the tooth saved. If it is the professed object of the dentist to save teeth, he should save all the teeth he can, and also as much of any one tooth as the best means in his power will enable him to preserve for the benefit of his patient. All the dentine or enamel thus saved can be considered as an advance in our practice, and be it little or much, the mere ability to save it by means of this preparation, constitutes, in my opinion, a most powerful claim in its favor.

The ease with which separate masses of gold are welded together under the condensing instruments, is another valuable property. It enables the operator, after thoroughly packing a thin layer in the bottom of the cavity, to pack another layer upon it. The two, uniting completely, forming, if properly worked, a solid mass of the metal.

These layers can thus be added until the whole cavity is filled, by what is thus rendered one solid piece of gold, as solid and compact at the bottom, sides and centre, as it is upon the surface. Of course, a filling possessing these requisites should finish up well, and this can be really finished beautifully, though in this respect it will not surpass foil when worked by skillful hands, unless it may be in the durability of its brilliance, which I believe will prove to be the case in consequence of the greater solidity of the mass.

These preparations are admirably calculated for filling compound cavities. Where decay has extended to more than one side or sur-

face of the tooth, such cavities can be filled and the form of the tooth restored with greater ease and security than with foil. The gain here is in the time, labor, and in the durability of the operation, as also in the occasional saving of tooth substance, in consequence of the diminished necessity of using the file.

"Another advantage yet unmentioned is no slight one. It is always ready to be put into the cavity; it has only to be broken into small pieces of suitable size. Hence, the time spent in cutting, rolling, folding, or twisting the foil, can be more profitably employed.

"To sum up; its claims for professional favor, are:—1st, a saving of labor, of which most men are not too fond. If any are, they have 2d, a saving of time, and can consequently accomplish more in a day, if they wish. 3d, a saving of tooth substance, in fact, of teeth. It is for this object we practice. 4th and last, and greatest, a better operation when completed.

"I now propose to notice some objections I have heard raised against its adoption. They are more fallible than numerous—some are very trifling, though seriously urged, viz.—1st, *it is too expensive;* 2d, there is too great waste; 3d, it will look badly in a front tooth when the walls of the cavity are composed only of enamel; 4th, a dentist will have to learn to fill teeth over again; 5th, an entire change of instruments will be required.

"When I state that these are all the objections that have come to my ear, and I have heard the opinions of quite a number of dentists expressed, I believe many who may read this article, and who have hitherto considered the new preparation a humbug, will at once give it some attention. I most earnestly beg of them to do so, and hope they will give the profession the benefit of their experience. As the above objections have been seriously urged, I will endeavor to give them serious and satisfactory refutation.

"As to the first, the cost, per ounce, is about the same as the best quality of gold foil. The advantages enumerated in the foregoing pages render it the cheapest in the end. 2d, in this respect there is a vast difference in the preparations offered for sale in this city. The one made by White, of Utica, is the one I have used the most extensively, it is darker colored, less plastic and less tenacious than the article made by J. A. Watts & Co., of the same place; it crumbles more readily, and on that account gives trouble while filling the superior teeth. Where it can be used with facility, however, it possesses all the advantages over foil that I have enumerated, though

not in as great a degree as the preparation of Watts. The latter is much more plastic and tenacious. It does not waste any more than foil, and I am satisfied that it will prove in any and every case better than the best foil.

"The difference in color is sufficient to answer objection No. 3; Watts' preparation being near the shade of Abbey's foil, if any thing, a shade lighter, and less brilliant when not burnished, consequently less apt to be noticed through the enamel. As to objection No. 4, I can only state my belief, that a good operator will, after a little practice, be able to work it with more ease than he can foil, and with greater service to the patient, and as for the poor operator, it will doubtless be greatly to his patient's benefit, the very first time he uses it instead of foil; in either case, the art of using it must be acquired, no matter at what expense of time, labor and money, if its use is going to benefit our patients. And now for No. 5. The ordinary round-pointed pluggers, with grooves filed across their edges in different directions, so as to leave a number of small, well-defined points, are all that will be required for external cavities; for approximal cavities, we have only to combine the rough, condensing surface with an instrument sufficiently small as to allow of its being introduced between the teeth and into the cavity.

"There has been also before the profession a preparation of crystallized gold, made by Messrs. Taft & Watt, of Ohio. It resembles, in color and style, the article made by White; it is, however, harder, and from the specimens shown to me, I should pronounce it inferior to either of the above."

4.—*Removal of a Large Portion of Maxillary Bone.*—Dr. R. A. Miller describes in the April number of the News Letter, 1854, a case of fracture and the consequent removal of a large portion of the superior maxillary bone and floor of the antrum. The fracture was caused by the unskillful attempt of a dentist to extract the second right superior molar. "The fracture commenced immediately in front of the anterior buccal fang of the second molar, and about a third of an inch in front of the palatine fang, and extended up to, and included the floor of the antrum Highmorianum and back to the pterygoid process of the sphenoid bone." Dr. M. states that the patient is doing well.

5.—*New Plan for Removing Teeth from a Plate.*—George W. Whitaker, in the same number of News Letter, offers a new plan for the removal of teeth from plates, by pursuing which he thinks the teeth will not be cracked.

6.—*Crystallized Gold.*—In the April number of Dental News Letter, for 1854, Prof. E. Townsend gives his views on the subject of crystallized gold. He says: "The first offered to me for trial was prepared by White, of Utica, on the first of October, 1853. Prior to using it, I had its quality tested by the highest authority for standard, the assayer of the Mint of the United States, who gave me, as the result of his tests, that there was 993½-1000ths pure gold; in this respect, being equal to the foil in general use, and superior to most. My next step was to fill teeth in the hand, and after filling, to split them open. I found the gold on the surface next the dentine, to my astonishment, nearly, if not quite as hard as the surface which had received direct pressure from the instrument. I next tried filling the cavity with water, and packing the gold so as to force it out; this I did not think made so reliable a filling, and it was more difficult to give the same polish to the surface.

"To test the relative amount of gold which could be put in a given space, I filled a cylindrical cavity in a piece of ivory, so prepared, that being filled from the larger end of the tube, it could be forced out readily from the smaller; then, after filling the same as tightly as possible, and weighing the two fillings, found the crystal filling the heavier by one-fifth.

"The first experiment in the mouth was the centre of an inferior molar, a very large cavity, and the margins thin. This was filled dry, and very successfully, and in much less time than would have been required in the ordinary way.

"No. 2. *Inferior molar, buccal surface, portion of the cavity under the free margin of the gum.*—This it was impossible to keep dry, and in three weeks the patient returned, with the complaint that the filling had come out; found the lower portion had come out, removed the balance, and filled the cavity with foil. This failure I attributed to want of skill in the use of a new article.

"No. 3. *Superior bicuspid.*—Nerves removed, filled the fangs and

crown; the only difficulty here was the falling from the forceps of portions into the mouth. This filling has been inspected recently, and looks well.

"No. 4. *Two superior incisors.*—Very large cavities and thin margins; both filled successfully, without cracking or injuring the front, and are as well now, four months after, as when they were finished.

"No. 5. *Very large cavity in anterior face of superior molar, passing under the free margin of the gum, and a cavity in the posterior face of the bicuspid opposite.*—After the two fillings were placed and consolidated, it was found very difficult to file between them to leave a free passage, as the gold had joined at the upper part, and become as hard as iron, or even harder.

"These are only a few of the cases in which I have used it in the last five months. I do not think sufficient time has elapsed to prove incontestibly its usefulness, or its superiority over foil in those cases where the difficulty of using foil is considered insurmountable; nor do I think it will ever supersede the use of foil as a permanent filling. Some of its best qualities for the purpose of filling weak teeth, also make it very easy to fail in making a perfect filling. Pressure upon the surface will not press it out laterally, and by so doing force it closely to the walls of the cavity. Each piece adheres to that beneath it by direct packing; and so, the very property which constitutes its safety makes it liable to be imperfect around the edges of the filling. It is necessary to pack all around the edges and make them secure, and fill the centre last. A different kind of instrument is necessary, having a rough end, sharply cut or serrated; and with a little dexterity in its use, the gold can be taken upon it and placed in the cavity without the use of forceps. There are three makers vieing for excellence in its manufacture: White, of Utica, of which I have used three ounces; in the last portion perceive a great improvement in adhesiveness, and consider it quite equal to any I have seen. Watts, also of Utica, N. Y., a chemist by profession, has been very successful in the manufacture of the article, and his gold is perhaps equal to any offered; and Taft & Watt, of Xenia, Ohio. These gentlemen are practicing dentists, and I am told intend to give the recipe to the profession when they have perfected it.

"I look upon the introduction of this article into use in the profession, as an important era, in the hope that it will soon entirely take the place of all amalgams and succedaneums for filling teeth,

substituting a pure for an impure article, as I am fully persuaded there are many gentlemen in the profession who have used amalgams with the honest belief that they could do more and better for their patients' good with it than with gold foil."

7.—*Soldering full or partial Sets of Teeth.*—Dr. Hackworth offers to the profession, through the News Letter for April, 1854, his plan for soldering full or partial sets of teeth, by which, in the use of a peculiar kind of shovel, he thinks much unnecessary labor is saved. Dr. Gerhart announces, through the same number of the News Letter, two singular cases, one of a gentleman twenty-three years of age, who still had "the teeth of first dentition and none others," "the other case was that of a child two years old, whose regular lower central and lateral incisors were perfectly united."

8.—*On the comparative periods of Decay of the Bicuspid and Molar Teeth at different periods of life in the sexes.*—Dr. W. A. Pease, in the Dental Register for April, 1854, says, "that some may regard his paper as a work of supererogation, and inquire what good is to be derived from such statistics," &c.—the Dr. then, after some other general remarks goes on to give the method that he adopted in order to accumulate his facts—the plan was as follows: "When a tooth was extracted for an individual who neither required or expected to have another operation performed, it was recorded in a book kept for the purpose, wherein the age, sex, maxilla, name and part of the tooth were disease commenced, was indicated by characters. There was also regarded, with equal care, the name of the tooth, and all operations performed upon it, for all classes though in a different form; and from a cursory comparison, it is believed the period of attack will nearly coincide among the wealthy and poor, though slightly in advance of the former class. The cause of preponderance of males over females, arises from the greater attention females bestow on their teeth." After some further deductions, he give his tables, which we present to the reader, together with a part of an explanatory note by the editor of the Register.

Superior Maxilla—Male.

AGE.	1st Bic.	2d Bic.	1st Bic.		2d Bic.		1st Molar.				2d Molar				3d Molar.				TOTALS.
	c.	c.	fs	ps	fs	ps	c	fs	ps	ls	c	fs	ps	ls	l	fs	ps	ls	
Under 15							6	3		1									
" 20			5			2	10	4	1	1	1		1	2	1				
" 25			8	7		20	22	19	10		10	2	1	2	4	1	1	1	115
" 30			3	13	8	6	31	7	11		9	2	1		11	7		3	112
" 35	1	1	8	2	8	4	13	3	1		5	3			4	4	1		58
" 40			4	1	3	2	2	1	1		2	1	1		1	1			20
" 50							1								2		1		4
	1st bicuspid crown	2d bicuspid crown	1st bicuspid, front side	do. post. side	2d bicuspid, front side	do. post side.	1st molar crown	front side	post side.	labial side	2d molar crown	front side	post. side	labial side	3d molar crown	front side	post. side	labial side	
	1	1	28	23	28	34	85	37	24	2	27	8	4	4	23	13	3	4	309
			52		63		148				43				43				

Inferior Maxilla.—Male.

AGE.	1st Bic.	2d Bic.	1st Bic.		2d Bic.		1st Molar.				2d Molar.				3d Molar.				
	c	c	fs	ps	fs	ps	c	fs	ps	ls	c	fs	ps	ls	l	fs	ps	ls	
Under 15						2	23	7	1		3								36
" 20				2	1	1	6	8	1			1			3				23
" 25			2	4	2	2	31	13	14		21	6	2	2	8	4		4	115
" 30					3	7	23	13	8	4	17	4	2	1	19	3	2	6	112
" 35				2	3	2	9	5	3	1	11	2	1	2	15	1		4	60
" 40		1			1	2	4	1			2	1			5	1	2	2	29
" 50							3												3
		1	2	8	10	16	99	47	27	5	54	14	5	5	50	9	4	16	378
																			309
			10		27		177				88				79				687

Note.—In explanation of the tables appended, which accompany Dr. Pease's article, we would say, that the letter C. stands for decay in the crown or centre of the tooth: the letter F. for front approximal, (locating the decay at that point;) the letter P. for posterior approximal; and L. for decay on the labial face of the tooth.

Superior Maxilla—Female.

AGE.	Bicus-pid.		1st Bicus.		2d Bicus.		1st Molar.				2d Molar.				3d Molar.				TOTALS.
	1st crown.	2d crown.	f. side.	p. side.	f. side.	p. side.	crown.	f. side.	p. side.	l. side.	crown.	f. side.	p. side.	l. side.	crown.	f. side.	p. side.	l. side.	
Under 15				1		1	10	1											13
" 20			4	2	4	5	19	2	2		2		1	1	1	1			44
" 25		1	7	16	11	10	20	9	2	1	7		1	1	8			4	98
" 30			3	9	14	6	17	7	1		9		1	1	12	1		8	88
" 35			3	4	8	6	4	1	2	1	4	1	1		4	1		3	43
" 40			1			1	1	1			1				3				8
" 50										1								1	2
		1	18	32	37	29	71	21	7	3	23	1	4	3	28	3		16	296
			50		67		102				31				47				

Inferior Maxilla—Female.

AGE.	1st Bicuspid.			2d Bicuspid.			1st Molar.				2d Molar.				3d Molar.				
Under 15			1				17	3		1	1								23
" 20			1		4	3	9	4	1	1	4	2	1	2	3				35
" 25			1	1	2	1	32	8	6	2	20	2	2	1	14		1	6	99
" 30		3	1	1	3	7	24	9		2	14	3	1	2	16	2		9	97
" 35			3	2	2	1	9	6			4	1			11			3	42
" 40		1	1	1			1	1	1										6
" 50			1															1	2
		4	9	5	11	12	92	31	8	6	43	8	4	5	44	2	1	19	304
																			296
			14		27		137				60				66				600

9.—*Nitrate of Silver as an Application to the Teeth.*—Dr. B. T. Whitney, in the April number of the Register, says, that there has been a prejudice in regard to the use of *nitrate of silver as an application to the teeth,* which he thinks a close examination into the subject will dispel. He then describes the way the article is made, and afterwards he endeavors to prove that indilute solution will preserve animal matter. He says, "as an application to decayed or denuded teeth, that have become sensitive, I hold it in high estimation. It acts decidedly, and in a two-fold way—in destroying the animal fibres that, in their ramification through the body of the tooth, become exposed and inflamed—and then, by

closing the mouth of the cells with the silver, which, in parting with its corrosive power, unites with oxygen, and forms an inert metallic oxyd. This gives a coating of insoluble metallic body over the denuded part of the tooth; though exceeding thin, yet sufficient to protect the nervous filament and dentine from irritation and contact with the 'outer world.' The tooth body being porous, absorbs more or less of the nitrate, which soon oxydizes, and gives the tooth a blackened appearance. These canals, though sufficient to transmit nutriment from the nerve pulp, through the dentine, are too minute to allow the introduction of the particles of nitrate of silver to a very great depth, so that the discoloration is superficial.

"That the oxyd of silver closes the cells, and forms a metallic surface, is perfectly demonstrable, by immersing a tooth, with the dentine exposed, in a solution of the nitrate, and then place it under the blow-pipe, with a heat sufficient to fuse the silver, when a bright silver surface will appear to the naked eye, susceptible of bearing a polish with a burnisher, almost equal to that deposited by the electro-galvanic battery upon a metal surface."

10.—*Combined Bellows, Blow-pipe and Forge.*—Dr. J. W. Baxter describes an apparatus in the Register for April, 1854, called *"combined bellows, blow-pipe and forge."* He mentions it as being "cheap and useful." This gentleman has also invented "riveting forceps" and an "artificial leech," which he describes in the same place; our space will not permit us to enter into a description at present.

11.—*Lusus Naturæ.*—Under the editorial head in the April No. of the N. Y. Dental Recorder, is mentioned the case of Miss C., about thirty-five years of age, who was possessed of two supernumerary teeth, occupying the places of the right and left superior dens sapientiæ "lusus naturæ." Dr. D. F. Lamborn reports a very singular case, a description of which we clip from the July number of the Dental Recorder.

"It is a superior third molar, with two crowns developed from three roots, and appears somewhat like the ossific union of a supernumerary with a third molar. But such is not the case, for the nerve exposed by decay of the main crown ramifies to the three roots in the same manner, which would not be the case in ossific

union of two teeth. Several of my professional friends have examined the tooth, and among them Dr. B. S. Codman, of Boston, and they are of the above opinion."

12.—*Cure of Tooth-ache by Emetics.*—By Cesar Fredericq, of Ghent.—We copy the following, with the appended remarks of Dr. Wood, one of the editors, from the July number of the Southern Journal of Medical and Physical Sciences, for the present month.—*Eds.*

The pain caused by a carious tooth, observes the author, is sufficient to induce the sufferer to try every means for relief. Of all topical anti-odontalgics, creasote, as a cautery, appears to me to possess most advantage. But besides these remedies, there is one too much neglected, in my opinion: I mean, the use of emetics. Ipecacuanha, given in a vomitive dose, in case of tooth-ache, has been followed by a success wholly unexpected. It answered even in cases where the neuralgia has remained after the extraction of the tooth. Emetics constitute a valuable resource in cases of odontalgia without caries. There are many varieties of tooth-ache. It may be symptomatic of other affections, or it may be produced by an ephemeral cause. Commonly the pain is attributed to the caries; but, if so, why should not the pain be permanent in a carious tooth? Why do not people suffer continuously? Some determinate cause must be at work for the production of pain; and this varies considerably. The author believes that gastric disturbance often coincides with odontalgia, and that the close sympathy which exists between the stomach and the brain, explains why a powerful impression made on the former should exert an influence on the nerves of the head.—[*L' Observateuer Sciences Mēdicales.*]—*London Lancet.*

[In cases where creasote is useful, i. e. where the nerve is exposed to irritants, emetics can be of little avail except temporarily as a counter-irritant. In such cases, arsenious acid, "as a cautery," is always efficient, being combined with morphia and creasote. The nerve of a tooth being dead, and the pain arising from alveolar abscess or its antecedent, a cathartic, *for the constitutional remedy*, is generally preferable to an emetic. Indeed where tooth-ache is treated *constitutionally*, by remedies addressed to the *primœ viœ*, whatever its direct local cause, if aggravated by gastric disturbance, *abstinence* and *laxatives* are properly indicated, (with topical appli-

cations suited to the case,) though an emetic answering the same end, may, in certain cases, be substituted with advantage. Where the pain is properly, purely neuralgic, from general nervous irritation, (in which, of course, creasote and the like are wholly useless,) a "powerful impression" on the stomach may be effective, (at least temporarily,) by diverting the irritation, or, perhaps, benumbing the nervous sensibility of this organ, supposing it to be the seat and source of the irritation.]

ANATOMY AND PHYSIOLOGY.

13.—*Influence of Respiration on the Pulse.*—Dr. S. W. Mitchell publishes an interesting paper on this subject in the *American Journal of Medical Sciences for April.*

His results are not confined to the ordinary subjects of study in this connection, but embrace the various changes consequent upon the respiratory movements.

As a preliminary step, he investigated the influence of mental attention on the heart's action. He found that the pulse was slightly accelerated, but not sufficiently so to interfere with his results. Study or close application of the mind renders the pulse less frequent.

Inspiration diminishes the frequency of the pulse, and sometimes a very forcible inspiration seems actually to suspend the heart's action. Expiration, on the other hand, quickens the circulation, and these effects are most marked as the respiratory movements approach their extreme limits.

In a careful analysis of forty cases, it appears that the diminution of pulsation during inspiration was 10.5 beats in 80.5, or 13.17 per cent., while its increase during expiration was 12.6, in the same number, or 15.65 per cent. on the normal standard. The average difference between the extremes of respiration was 23 beats. In one case there was no fall of pulsation during inspiration, but in all there was a rise during expiration. The greatest increase observed in expiration, was 35 over 81, the natural standard; the smallest was 1 over 89. The greatest relative decrease observed, in inspiration, was 24 in 82. The greatest absolute decrease was 28 beats, the normal pulse being 96. It is to be observed, that the

mobility is not the same for expiration and inspiration. Thus, the patient who only gained 1 beat in expiration, lost 16 in inspiration, while the one who lost nothing in inspiration gained 12 in expiration. The smallest difference between the extremes was 11, the greatest 44 beats.

The respiratory capacity of the lungs does not appear to exert any influence over the change of rapidity.

As an illustration of the physical cause of these changes, the writer suggests the figure of an elastic bag, with elastic tubes coiled about its walls. The bag being distended, these tubes are stretched and diminished in calibre. In the lungs, the vessels are distributed over the walls of the cells. When these last are distended, as in inspiration, the capillaries are stretched, and perhaps compressed. To determine this point experimentally, carbonate of soda was injected into the pulmonary vessels of a living animal, after which, all the thoracic viscera were removed and placed in a solution of the same salt. A long glass tube was then fitted into the pulmonary artery, another into the left auricle, and a third, provided with a stop-cock, into the opening of the trachea. Dilute serum was then poured into the tube of the artery, till a bloody liquid rose from that inserted into the vein. The lung now being inflated, the level of the fluid fell in both tubes, most in that inserted into the artery; when the inspiration was forced and permanent, the circulation ceased entirely. During expiration, the column in the pulmonary artery fell, till both columns stood at the same level.

In vivisections, it was observed that the lung always flushed during expiration, and became pale on inspiration. When the lung was slightly wounded during full inspiration, no hemorrhage occurred, but the lung bled during expiration. The bleeding was always more copious during expiration, provided no large vessel had been wounded.

The author draws the following inferences:

1. "It seems to me clear enough, that the pulmonary circulation is modified by the various conditions of respiration, in which the lungs may be placed. Do not, relatively, similar effects attend every respiratory movement, however simple? We cannot demonstrate this upon the healthy living lung, yet the inference would seem to be a fair one.

"2. During complete inspiration, the tide of blood is momentarily retarded in the capillaries of the lung. Aeration of the vital fluid

then takes place with the greatest facility; and during expiration, and more especially in complete expiration, the blood thus fully aerated is expelled from the lungs by the rapidly acting heart. In other words, the circulation in the lungs is slower when these organs contain most air, and becomes most easy and rapid during the movement of expiration.

"The effect of respiration in mechanically diverting the blood from the course of the fœtal circulation, is also of interest in this connection."

14.—*Cellulose in the Human Body*—A very remarkable discovery was made by Purkinje, when he saw bodies in the human brain which resembled granules of starch, and corresponded to that vegetable substance in their relations to chemical reagents.

Virchow has lately examined them, and has ascertained that they possess all the chemical properties of cellulose, a substance hitherto regarded as characteristic of vegetable organisms. Iodine colors them light blue, and hydrated sulphuric acid gives the violet tint which forms the specific characteristic of vegetable cellulose.

They belong, he says, exclusively to the ependyma, and are found only in the superficial layers of the ventricles, in the spinal marrow, particularly the central gray substances corresponding to the ependyma of the obliterated canal, and in the nerves of the senses, as in the gray substance of the olfactory nerve other concentric corpuscles from organs included without the cranium and spinal column, show no such reaction.

These corpuscles have since been sought for in various parts of the body without success. In waxy spleen, however, Virchow has found similar bodies, the result of a transformation of the Malpighian glands into grains resembling boiled sago. Iodine and sulphuric acid especially produce the characteristic reaction of cellulose.

15.—*On the Movements of the Glottis in Respiration.*—Dr. John C. Dalton, Jr., contributes to the American Journal of Medical Science, an article with the above caption.

He has proved satisfactorily by experiments on living animals that "there is, during normal respiration, a constant and regular motion

of the vocal cords, by which the size of the glottis is alternately enlarged and diminished, synchronous with the inspiratory and expiratory motions of the chest. These movements are of the same character as the general automatic motions of respiration, of which they in fact form a part. It is at the same time, and by the same nervous influence, that the chest expands to inhale the air, that the glottis opens to admit it. When the chest collapses, the glottis returns to its original size, and the air is expelled through it from below."

The separation of the chords and the consequent opening of the glottis is effected by the action of the posterior circo-arytenoid muscles, which rotate the arytenoid cartilages outward and backward and at the same time draw them backward, so that the opening of the glottis is at the same time lengthened and widened. The motion can be produced in the recently killed calf by irritating the first terminal branch of the inferior laryngeal nerves which furnish the motor power. A section of these nerves instantly puts a stop to the motions under consideration, and the chords of the glottis are closed like a valve by the column of air.

These nerves being given off by the pneumogastric within the chest, have their function necessarily impaired when the main trunk is cut in the neck, so that paralysis of the glottis is one of the consequences of this operation. To determine the difference between a section of the main trunk and its recurrent branch, two dogs were selected, in one of which, (No. 1,) the pneumogastrics was cut, and in the other, (No. 2,) the inferior laryngeals. The only marked difference in the symptoms was the diminution in the frequency of the respiratory movements in the animal that had its *par vagum* cut. In the other, the respirations continued frequent and laborious to the end. Both died between 30 and 40 hours after the operation. Both had the same congestion of the lungs. No. 1 had his blood coagulated and the abdominal organs natural, while No. 2 had the blood fluid and the abdominal organ congested.

"This experiment," says the observer, "affords additional evidence of the two following facts, which have been already more or less generally acknowledged by experiments:

"*First.* After section of the pneumogastrics, death is produced by congestion of the lungs.

"*Second.* This congestion is not a direct effect of the division of the nerves, but is caused by the imperfect admission of air into the chest."

16.—*Elasticity of Arteries, a Source of Animal Heat.*—The Medical Times and Gazette for May 27th, contains a paper from Dr. Winn, calling attention to the influence on the production of animal heat of the elastic recoil of the arteries.

He shows that there is a *residual heat*, not accounted for by physiologists on the basis of the oxydation of carbon and hydrogen in the system. His attention was called to the possibility of the arteries producing heat, by some experiments which he had made upon caoutchouc. To determine the fact, he had recourse to direct experiment.

He took about an inch of a bullock's aorta, laid it open, stripped it of its inner and outer tunics, and by alternately stretching it and allowing it to contract, he succeeded in developing sufficient heat to raise the thermometer two degrees in as many minutes. He took the necessary precautions against the influence of external heat. He muffled his hands in a double wrapper of flannel, covered his mouth with a handkerchief, to prevent the warm breath from influencing the thermometer, and performed the experiment in a room without a fire, at 55°. To prevent evaporation, he dried the artery as much as possible, with a cloth.

17.—"*The Process of Repair in Teeth.*—The recent number of *Guy's Hospital Reports*, contains a very interesting communication by Dr. S. J. A. Salter, on the laws which regulate the formation of the "Dentine of Repair," one of the forms of what has been called secondary dentition, or that after formation by which the pulp cavity of the tooth is diminished or obliterated, after the tooth has attained a mature and adult condition.

"There are three forms of secondary dentine: *Osteodentine*, in which the new tissue is arranged in systems resembling the Haversian systems of bones around isolated blood-vessels; the dentinal tubes radiating from each centre. It always occurs in states of irritation or inflammation of the pulp. *Dentine excrescences* are little nodules of secondary dentine, occasionally found attached to the interior of the pulp cavity of otherwise healthy teeth. *Dentine of repair* is the special subject of the paper. This deposit is thrown out within the pulp cavity, *opposite* to that part of the external surface of the tooth where a fracture or wearing of the original dentine has taken place, thus thickening the body of the tooth opposite the

injured part, so that teeth which are worn down even level with the gum still present no cavity.

"This process corresponds with the most beautiful exactness to the external lesion; as long as the enamel only is injured, no dentine of repair is deposited; but as soon as any of the dentine tubes are broken off or worn away on the surface of the tooth, so soon is there thrown out at their opposite extremities towards the pulp a deposit, limited with the utmost exactness to the injured tubes; not mathematically opposite, therefore, to the injured part, but *physiologically* opposite, according to the wavy course of the tubes. The dentine of repair is clear and translucent, and the part of the original dentine involved in the process becomes also more transparent than usual, in consequence of its tubules being filled up with solid matter."

18.—*Relations of Fat and Sugar.*—Dr. Gibb read a paper before the physiological section of the Medical Society of London, on the subject of the relation of the fat in the liver to its sugar.

He found that, in birds, those which had the most fat, had also the most sugar in the liver. Among the mammalia, those which possessed but little fat in this organ had also little sugar there, while those, which, like seals, had the liver gorged with fat, also contained large quantities of sugar in the same organ.

19.—*Phosphate of Lime in Nutrition.*—The Virginia Medical and Surgical Journal contains an abstract of a paper by Bouchardat, on some recent discoveries of Mouriés, a young French chemist, in the part played in nutrition by phosphate of lime.

His conclusions are the following:

"1. Phosphate of lime plays a more important part in nutrition than has heretofore been believed. Independently of its necessity as a constituent of bone, this salt maintains that irritability without which there is no assimilation, and consequently no nutrition. Its insufficiency, therefore, produces death, with all the symptoms of inanition, while its insufficiency in a less degree produces a series of lymphatic diseases.

"2. The food consumed in cities is deficient in this respect. Nurses' milk has, consequently, the same defect. The infant, as

well as the fœtus, suffers from the deprivation of this element, so indispensable to its development and life. Hence one of the causes of the increase of the number of still-born children, and of the mortality of infancy.

"3. The addition of this salt, in combination with animal matter, to alimentary substances, obviates one cause of disease and death."

The report goes on to show that different species of animals require different proportions of this salt, but that the proportion is constant for each species. It also reveals the remarkable fact of a close relation subsisting between the amount of phosphate of lime in the blood and the normal temperature of the animal, from which the author infers that this salt keeps up animal irritability, without which nutrition is impossible. One of the tables is so curious that we cannot refrain from copying it. The temperature is rated by the centigrade thermometer, now commonly used in scientific observations.

	Phosphate of Lime.	Temperature.
Blood of the duck,	1.50	42.5°
" " hen,	1.35	41.5
" " pigeon,	1.20	40.
" " man,	.80	37.5
" " horse,	.40	36.8
" " frog,	a trace	9.

If these tables are correct, it is impossible to avoid the conclusion that this salt plays an important part in the generation of animal heat.

The amount of phosphate of lime necessary to repair the waste of the system is then estimated, upon the basis of the excretions, as 110 grains daily. Women in the country discharge, according to this chemist, 90 grains of this salt in their urine, whereas the quantity in the secretion of the kidneys in city women varies from 20 to 90 grains in the 24 hours. In 18 healthy country women, the milk contained from 1.2 to 2.4 per cent. of earthy phosphates, while, in 10 Paris nurses, the proportion varied from 0.5 to 0.9 per cent., and in 7 others there was but a trace of this salt.

The results of a mode of treatment consisting in supplying phosphate of lime artificially were favorable. In 13 cases, having an average of 0.7 per cent. of phosphate of lime, 75 grains with twice the quantity of albumen was daily administered in soup; in a week the proportion of earthy phosphate rose to 2.1. Five pregnant women were subjected to the same treatment; after delivery their milk

contained from 1.9 to 2.1 per cent. of phosphate of lime. Only 3 of the 18 children died.

If these statements are true, as they probably are, since they are brought forward under the auspices of Bouchardat, our readers will be able to see the connection between them and the very important fact of the rapid decay of the teeth in some sections of this country.

EDITORIAL DEPARTMENT.

BIBLIOGRAPHICAL NOTICES.

Chemical Lectures on Pulmonary Consumption. By Theophilus Thompson, M. D., F. R. S., &c. Philadelphia. Lindsay & Blakiston, 1854, pp. 259.

Few diseases have been more carefully studied than the melancholy one of which these lectures treat. Preeminently the scourge of the gifted, the beautiful, the refined, it is invested with a fearful charm to all who approach it. Then the sad conclusion to which the physician, who has studied every fibre of the frame, every circumstance of the disease, must come, the futility of attempting any thing beyond securing an euthanasia, adds to the melancholy interest of the whole subject.

Much, however, as this affliction has been studied, the complaints have been numerous, and not altogether unjust, that the method of examination has become more and more objectionable. Too much attention has been bestowed upon the physical signs arrived at by mere stethoscopic examination. The minds of pupils, especially, have been entirely too much concentrated upon this method of study. This is objectionable, as all one-sidedness in medicine is objectionable. It prevents that expansive and all-comprehending survey of the phenomena of disease, without which medical philosophy is impossible.

The volume before us appears to us a return to a better method. Without neglecting auscultation and percussion, which none but a deaf man or a grossly incompetent one could think of, the author does not force them into that exclusive preeminence to which their friends consider them entitled. He regards them as symptoms only, to be taken in connection with other symptoms, in order to arrive at a true idea of the disease.

The author has enjoyed excellent opportunities for the study of this very

important disease, being the physician to the Hampton hospital for diseases of the chest. The lectures took each its specific color and direction, from the circumstances of the cases which were examined at each. In consequence of this, we have interesting disquisitions on a variety of individual topics, each one of which is of importance to the practitioner of medicine. The pulse, the expectoration, the chemistry of the blood, the conditions of the urine, are all separately considered and each is treated in a plain, practical manner, which cannot fail to be acceptable to the practicing physician.

We were glad to see that Mr. Thompson speaks favorably of the action of cod liver oil in consumption. He narrates some cases which are much stronger than any we were prepared to expect. The healing of vomicæ as exhibited by the physical signs, at the same time that the weight increased and the strength improved, is certainly a fact calculated to inspire the physician with renewed hope for the patients suffering under this deadly blight.

We strongly recommend the book to both student and practitioner. There is nothing in it, from title page to finis which is not eminently practical.

The Science and Art of Surgery, being a Treatise on Surgical Injuries, Diseases and Operations. By John Erichsen, Professor of Surgery in University College and Surgeon to University Hospital. Edited by John H. Brinton, M. D. Illustrated by 311 engravings on wood. Philadelphia. Blanchard & Lea, 1854, pp. 908.

The motto of this book is a suggestive remark of the great Chancellor: "They be the best chirurgeons which, being learned, incline to the traditions of experience, or being empirics incline to the methods of learning." It is the production of a man who is at once a philosopher and practitioner, a careful observer of facts, and an assiduous student of other men's observations.

To pretend to give any idea of such a work in the short limits of a bibliographical notice would be absurd. We shall only say that it is a full and candid statement of the present condition of surgical science and art.

The arrangement of the book is somewhat peculiar, as must necessarily be the case when an author thinks for himself. Every man must arrange his subject in that order in which it is most lucid to his own mind, and when there is no idiosyncracy manifest in the arrangement, there will usually be found no individuality in the thoughts of a book.

The author begins with an account of congestion, determination and inflammation. These important subjects are amply elucidated by numerous references to physiological experiments and engravings of microscopical phenomena. Then follows an account of the general principles of opera-

tion, particulary of amputations. These subjects comprise one division of the book, called by the author first principles.

The second division treats of surgical injuries. These include the general effects of injury, such as shock, traumatic delirium, &c. Injuries of the soft parts in general are then examined, the various kinds of wounds, &c., after which follow wounds of nerves, veins and arteries, the latter class being divided into wounds of these vessels generally, and wounds of special arteries. Injuries of muscles and tendons, of bones, of joints, of the cranium, the spine, the face, &c., and the whole division is closed by burns, scalds and frost-bite.

The third and last division comprehends surgical diseases. Abscess, ulcers, mortification, erysipelas, pyemia, tumors, scrofula and syphilis, as general diseases are first considered. Then diseases of special structures are taken up, and lastly, diseases of particular organs are considered.

The reader will perceive that a rigid and exact system pervades every department of the book, and we need only add that the plan is as well executed as conceived. The cuts are numerous and good and the whole book very well gotten up.

Turkey and the Turks. By Dr. J. V. C. Smith, author of a pilgrimage to Palestine, &c. Boston. James French & Co., 1850, pp. 320.

At the present time when the attention of the whole civilized world is directed to the east, people naturally desire the opinion of some competent and well informed observer, in regard to the state of the contending parties and the probable issue of the quarrel. As far as Turkey is concerned, the present condition of that country can be satisfactorily ascertained from the book before us. Dr. Smith spent some time in the Ottoman empire, and gives a very interesting sketch of the habits, manners and political condition of the Turks. He is a close observer and an agreeable writer.

The American Journal of Science and Arts, for July, comes to us as usual, stored with valuable matter.

Contents: on the first hurricane of September, 1853, by W. H. Redfield; account of a rainbow caused by light reflected from water, by E. S. Snell; a change of sea level effected by existing physical causes during stated periods of time, by Alfred Tyler; on the phosphate of iron and manganese from Norwich, by J. W. Mallet; on the homœomorphism of mineral species of the trimetric system, by J. D. Dana; on certain physical properties of light, produced by the combustion of different metals, in the electric spark, by David Alter; Chinese and Aztec Plumagery, by D. J. MacGowan; Binocular microscope, by E. D. North; mechanical action

of heat, by W. J. M. Rankin; the Brandon tornado of January 20th, 1854, by E. Loomis; considerations on the group of small planets situated between Mars and Jupiter, by Le Verrier; on electric induction, by Faraday; reclamation of borocalcite as distinct from a mixture of minerals, by A. A. Hayes; on the present condition of the crater of Kilauea, Hawaii, by T. Coan; note on the genus Buckleya, by Asa Gray; on the mode of giving permanent flexibility to brittle specimens in zoology and botany, by J. W. Baily; caricography, by C. Dewey; reviews and records in anatomy and physiology, by W. J. Burnett; correspondence of J. Nicklés; scientific intelligence; lists of new publications.

We have already expressed our opinion so freely of the merits of this periodical, that it can scarcely be necessary for us to add any thing more. We will, however, say that we consider it essential to every man who wishes to keep up with the progress of general science in this country.

An Address to the Public in Regard to the Affairs of the Medical Department of Hampden Sydney College. By several physicans of the city of Richmond. Richmond, 1853.

Our readers generally are acquainted with the fact that there has been for several years past, a successful medical school in operation in the city of Richmond. Being a branch of Hampden Sydney College, it has no charter, of its own, but acts under that of the parent institution. This fact has recently given rise to a breach between the faculty of the medical department and the president and trustees of the college. The faculty desire the filling up of vacancies which may occur in their body, while the trustees refuse to grant them any such permission, reserving it to themselves as one of their original and inalienable rights.

The present pamphlet is a vindication of the claims of the trustees, and contains the legal opinion of Messrs. Watson and Hughes, fully sustaining the views of the trustees.

MISCELLANEOUS NOTICES.

Prize of One Hundred Dollars Offered.—It will be seen by the following communication that the "Mississippi Valley Association of Dental Surgeons," have offered a prize of one hundred dollars for the best Essay on Dental Surgery, to be adjudged by a committee appointed for the purpose. This is right, and we trust that an essay worthy of so handsome a prize will be presented. There is, however, in the resolution making the appropriation a want of definiteness with regard to the subject, which may ren-

der it difficult for the competitors to meet the views of the association. What is meant by "Dental Surgery?" Is it intended that the essay shall cover the whole field of this specialty, or only treat upon a few of its branches? or is it designed merely to set forth its claims to usefulness as compared with the other specialties of general medicine? The subject, it seems to us, should have been stated more definitely. Were we disposed to compete for the prize, we should be at a loss to know where to begin, or where to leave off. We trust, however, that the liberal offer of the association will elicit a paper that shall be creditable to itself, to the writer and to the profession.—*Eds.*

For the American Journal of Dental Science.

Messrs. Editors:—It has become my duty to request the insertion, in the Journal, of the following extract from the proceedings of the "Mississippi Valley Association of Dental Surgeons:"

"1st. *Resolved,* That this association will award one hundred dollars, to the author of the best essay, (not previously published,) on dental surgery, *adapted to popular circulation;* to contain not less than fifty, nor more than seventy-five pages duodecimo; the copy-right to be the property of the society. Said essay to be approved by a committee, and by it to be printed and issued to the members of the society, and receive the approval of the association before it be published for general circulation.

"2d. *Resolved,* That a committee of five be appointed, by ballot, to examine the essays presented, and report at the next meeting. Essays competing for said award to be forwarded to the chairman of the committee, as early as January 1st, 1855.

"Election of said committee was had, and the following gentlemen appointed: James Taylor, W. H. Goddard, A. Berry, A. M. Leslie and J. Taft.

"*Note*—Authors sending essays under the above resolutions, will accompany them with their full signature and address, which they will enclose in a sealed envelop, which will be opened should the accompanying essay prove the successful one; otherwise, it will be returned with the manuscript."

Geo. Watt,
Cor. Sec., M. V. A. D. S.

Theory of the Circulation.—Every one who reads the medical journals knows, that for some time, what is known as Mrs. Willard's Theory of the Circulation, has been stoutly defended by some medical men in the southwest. Dr. Cartwright, mounted on his mutilated alligator, is ready to charge on any one who controverts this notion. One of the most remarkable articles, however, to which this discussion has given rise, appears in the Nashville Journal of Medicine and Surgery for the present month.

We do not intend to comment on this paper at any length, but simply to expose the fallacy of a few of its fundamental propositions. The first of these is, that caloric is generated *in the lungs* by the combination of carbon and oxygen. "This," says the author, "is probably undisputed at the present time." So far from its being undisputed, this hypothesis has, by common consent, been set aside. We do not know of a single physiologist of any note, who continues to hold this opinion. It has been disproved in every possible manner—chemically, physically, vitally—and any theory built upon it must necessarily fall to the ground.

The author of the article to which we allude does not stop here, but goes on to show that the heat so generated will produce sufficient expansive force to carry on the circulation. "*All anatomists,*" he writes, "*agree that the lungs are in vacuo.*" He then states the point at which water boils *in vacuo*, shows that it is below that of the healthy human body, and infers, therefore, that the fluid parts of the blood generate vapor enough to drive the vital fluid, with a sort of explosive force, out of the lungs.

It is astonishing how the ardent advocates of a theory over-leap every thing which lies between them and their conclusions. That is a novel sort of vacuum, indeed, which we find in the lungs. Outside, upon all the parietes of the chest, air is pressing, and inside, a column of air is constantly descending through the respiratory passages, mingling with that already in the lungs, and passing out to give place for a purer column, which is to enter at the next inspiration. Every little blood-vessel feels this pressure through the delicate mucous envelop which covers it. Every film of blood in the walls of the cells floats past this revivifying fluid, and interchanges gases with it as it goes, surrendering its carbonic acid and receiving oxygen.

The author has been deceived by the looseness of anatomical phrases. There is no air in the cavity of the *pleura,* and therefore the lungs fit closely to the thorax in all its movements. They are put into their movable box air-tight, but they are no more in a vacuum than the stuffing-box of a steam engine, which fits steam-tight around the piston-rod.

The Dental News Letter.—This journal complains, that in our April number we copied an article or two from it without giving due credit. Now accidents of this kind will occasionally happen, from hasty proof-reading and sometimes from neglect on the part of the printer to attend to the corrections made.

There is, however, no just ground of complaint in the present instance. The article by Dr. Evans, of Paris, is marked at the head of it, *continued,* and was duly credited in January, when the first part of it was copied. It was a mere oversight on the part of the printer that the name of the journal was not appended to the second part of the article in the April num-

ber. No reader, who had any common sense, would dream, for a moment, that the editors of this journal had any design to palm off the article in question as *original* matter, since it was put under the head of *selections* and credited, as we have already said, to its proper source in the previous number.

As to the second article, it appeared under the head of quarterly summary, which, of course, comprises only those facts and speculations which have *not* been published in our own journal. Owing to pressure of other business, the editors delegated the making up of the Quarterly Summary of Dental Progress to an inexperienced hand, who neglected to give credit to the *periodical* in which the article appeared, but fully acknowledged its *authorship* by giving Dr. White's name in full, and the summary of the first part of the article which appeared in the preceding number, was duly credited to the News Letter.

We have no disposition to trade upon a false bottom, and despise the meanness of appropriating the labors of another without due acknowledgment. We beg the editors of the News Letter to believe, that we would be just as much inclined to rob their money-drawer as to pilfer their articles. We were taught, from childhood, that the smallness of the larceny did not diminish the sin of the theft, and we have not forgotten the lesson.

Ossification of the Pulp of a Tooth.—We are indebted to Dr. F. H. Badger, of Nashville, Tenn., for a beautiful specimen of ossified dental pulp. In describing the circumstances connected with the case, the doctor says: "It was taken from the palatine root of the first right upper molar of my negro girl, aged about twenty, of full habit and healthy. She complained, for a few days, of severe pain in the tooth. Upon careful examination, I discovered, that though slightly decayed, the pulp was not exposed; the pain was but slightly increased on sounding it; no appearance of inflammation in the gums; the other teeth were sound. Refusing to have it extracted, she remained some days without relief. Finally, I was induced to drill into the pulp-cavity from the bottom of the decayed part, and apply arsenic. No pus escaped, but the patient was soon relieved. During the night the pain returned, with less violence, however, and at intervals. Some thirty-six hours after the application of arsenic, the cavity was sufficiently enlarged to extract the pulp, which, upon examination, was found to be interspersed with spicula of bone." The pulp was only removed from the two buccal roots which were filled, together with the cavity in the crown; the doctor finding it impossible to remove it from the palatine root. The patient not being relieved, the tooth was finally extracted, and after breaking off the crown and "enlarging to some

extent, the canal," the pulp, in an ossified condition, was removed from the palatine root. This, the doctor enclosed in his letter to the senior editor, who intends placing it in the Museum of the Baltimore College of Dental Surgery.

Brandy and Red Noses.—Douglas Jerrold, in some remarks on English and Swedish brandy-drinking, gravely asks the question, whether the red noses of the English dram-drinkers are not due to the various adulterations introduced into the liquors by British dealers?

This reminds us of the verdict of a coroner's jury among the Mohawks, some years ago. An Indian had gone into Albany, one cold winter's day, and got very drunk. On his way home he became completely overcome, laid down and was frozen to death. His tribe was at that time much disposed to imitate the habits of white men, and accordingly held an inquest over the dead body. After a long pow-wow, they finally agreed upon the verdict, that the deceased had come to his death "by mixing too much *water* in his whiskey, which had frozen in him and killed him."

The Late Dr. J. F. Flagg.—We publish in the present number of the Journal, a biographical notice of the late Dr. J. F. Flagg, long an eminent member of the dental profession, written by a gentleman of Charleston, Mass. We had hoped to have accompanied the biography with a likeness of the subject of it, but have not been able to gratify our wishes in this respect.

Dr. G. G. Brewster, of Portsmouth, N. H., has also furnished us with an ably written biographical notice of Dr. F., paying a just tribute to his memory, and narrating, briefly, the incidents of his life, from his boyhood to the period of his decease.

Dr. L. M. Cochran.—The senior editor begs to acknowledge the receipt of a specimen of osseous union of two temporary teeth, and another of dental exostosis, from Dr. Cochran, dentist, of Matagorda, Texas. They shall, agreeably to his request, be placed in the Museum of the Baltimore Dental College. Both specimens are interesting, and well worthy of preservation. Contributions of this kind will always be thankfully received by the Faculty.

Resignation.—We are sorry to learn, that, in consequence of ill health, Professor Townsend, of the Philadelphia College of Dental Surgery, has felt it to be his duty to resign the Chair which he filled in that institution. This must be a serious loss to the school, but we are gratified to be able to say that the vacancy will be filled by a gentleman every way competent to discharge the duties of the Chair.

Annual Commencement of the Baltimore College of Dental Surgery.—The fourteenth annual commencement of this pioneer of dental colleges was held in the Assembly Room of the College Building, on the evening of the 1st of March. The spacious hall was filled at an early hour with a brilliant audience; an array of youth and beauty, which the graduates of the evening must long remember in association with these the first proud moments of professional dignity.

The exercises were opened with prayer by the Rev. Thomas H. Stockton; after which the following list of candidates for the degree of Doctor of Dental Surgery, with their places of residence and subjects of theses, was read by the Dean, Professor Austen.

Henry Fitch Bishop, orthodontia, Worcester, Mass.; William Chapman, qualification of dentists, Mt. Sidney, Va.; Lemuel Montgomery Cochran, mechanical dentistry, Matagorda, Texas; Thomas TsCharner DeGraffenreid, duties of the dentist, Clarksville, Va.; John William Derr, sympathy, Lititz, Penn.; Samuel Dearborn French, caries of the teeth, S. Chesterville, Me.; James Washington Grant, professional excellence, Botetourt Co., Va.; Edward Nathan Harris, temporary teeth, Portland, Me.; Willard Frederick Hawley, preservation of the teeth, Wirt Co., Va.; Montgomery Jeter, caries and its treatment, Roanoke Co., Va.; Edwin Turner Ligon, dental progress, Farmville, Va.; Henry Wainwright Mason, odontalgia, Boston, Mass.; Hugh Samuel Paisley, mercury and its preparations, Houston, Miss.; Albert Potter, mechanical dentistry, Blackstone, Mass.; Lloyd Quinby, pathogenia of a tooth and its treatment, Houston, Texas; William Thomas Russel, structure and development of the dental tissues, (prize thesis,) Canandaigua, N. Y.; Roger Forbis Taylor, aliment of man, Lockhaven, Penn.; Warner Archer Williams, effects of diseased teeth on the system, Richmond, Ala.

These gentlemen were then called up in order and received their diplomas at the hands of President Harris, who, after a brief reference to their exemplary diligence as students, urged upon them in a few pointed words their duty as practitioners of dental surgery. The frequent strains of music by the admirable band, and the more frequent tossing of beautiful bouquets, gave to this part of the exercises great animation and interest.

The valedictory was delivered by Dr. Wm. W. H. Thackston, of Farmville, Virginia. Graduating from these same halls "twelve years ago, when this was a new and untried enterprize," he now stood before them, proud to know that "its permanent existence and necessity had become fixed facts." He had no need to prove dentistry a "science," for its claims to that rank were now beyond dispute: therefore, passing that, he would present to the consideration of the graduating class, a few reflections upon the "obligations they had assumed as practitioners and as alumni of this institution." The brief limits of this notice will not permit us to dwell upon the eloquent manner in which the orator urged his hearers to engraft upon the *esse quam videri* motto of honest industry, the *suaviter in modo*

maxim of the courteous gentleman. The address has been printed, and we commend it to the profession.

The prize of $50 was then awarded by Professor Bond to William Thomas Russel, of Canandaigua, N. Y., for his thesis upon the "structure and development of dental tissues;" after which the exercises of the evening were closed by the benediction.

Trouble in the Wigwam.—Two notorious homœopathic practitioners in this city have, it appears, been at loggerheads for some time in regard to the very important question of the possession of a diploma by one of them, and have at last appeared in the public prints through the medium of an advertisement.

The parties in the quarrel are Dr. McManus, one of the earliest practitioners of this species of quackery in our city, and one J. Schmidt, who may be known to some of our readers by a very silly onslaught he made a few years ago on our friend Dr. Bond. It appears that Dr. McManus had his doubts about the validity of the M. D. which Schmidt wrote after his name, as well he might on grounds far different from those upon which he based his objections. He accordingly erased Schmidt's name from the list of members of the American Institute of Homœopathy. The German, instead of regarding the act in its proper light, as a sort of compliment to his understanding, (for who would object to have his name struck out of the list of patients in a mad house?) took the matter in hand and had a committee appointed to look into it.

They ascertained that he had a document, which they call a diploma, from the Allentown Academy of Pennsylvania, an institution which has hitherto modestly concealed its existance from our benighted understandings, and appended the following resolution, which we copy as a choice morsel of homœopathic English. Its grammar has certainly reached the 30th dilution.

"*Resolved,* That Dr. J. Schmidt, of Baltimore, having a legal and valid diploma, from the Allentown Academy, of Pennsylvania, an institution which is now in existence, with the authority to confer medical (?) degrees, and we hereby acknowledge him to be entitled to the title of M. D."

Of the merits of the controversy we know nothing and care less, but so choice a curiosity in philology we could not consent to keep from our readers.

Obituary.—We learn with profound sorrow that Dr. Ludolph Parmly, Dentist, of Mobile, Ala., died during the latter part of the present month (July.) Dr. P. had resided in Mobile about twenty-two or twenty-three years, and during which time, he enjoyed, and deservedly too, a large and lucrative practice. In his death, the profession and society have lost one of their brightest ornaments, and most sincerely do we sympathize with his family and numerous relatives in their bereavement. Dr. P. was an honorable, a high and a liberal minded gentleman, as well as a scrupulously conscientious and eminently skillful practitioner.

INDEX.

PAGE.

A.

Americanized, another European principle, ... 30
American Society of Dental Surgeons, meeting of, &c . 59
Auroplastic principle, artificial teeth, &c., ... 79
Application of teeth, and natural roots, &c., ... 132
Artificial teeth, preparing the mouth for full sets, ... 134
Action of gastric juice, . 145
Anatomy, a text book of, &c., . 163
American Journal of Science and Arts, ... 164
Auroplastic base, . . . 176
A new method for base, . . 178
Artificial teeth, by the auroplastic principle, ... 223
Anatomy for the dentists, . 244
Alcoholic liquors, use and abuse of, &c., ... 322
Association of dentists, Mississippi Valley, ... 352
Address by Elisha Townsend, 374
Artificial teeth, new method of supporting, ... 481
Artificial teeth, new method, . 442
Alcohol and its effects, . . 494
American Medical Monthly, . 301
Artificial teeth, improved sets of, 573
Artificial teeth, instruction in the use of, ... 598
Arteries, elasticity of, . . 664

B.

Bate, C. S., Esq., filling teeth, exposed pulp, ... 20
Bridgeman, M. K., osseous union, 33
Brown, Chas., compound fracture of lower jaw, . . . 34

PAGE.

Blandy, A. A., D. D. S., M. D. physical condition of the teeth, 38, 425
Bate, Spence, Esq., irregular teeth, &c., . . . 93, 278, 282
Blow-pipe, ... 132
Bile, ... 149
Biliary secretions, . . . 149
Bull on the maternal management of children, . . . 161
Base, a new method, . . . 178
Blow-pipe, hot air, . . 238
Buckingham, S. L., M. D., . 265
Blood, temperature of, . . 317
Bronchitis and pneumonia, . 323
Badger, F. H., Dr., . . 331
Bellows, blow-pipe and forge, . 658
Brandy and red noses, . . 674

C.

Chemistry of the metals, 3, 181, 337
Case of compound fracture of the lower jaw, ... 34
Condition of the teeth, physical, &c., ... 38
Caries of the teeth, . . . 129
Chemical characters of gastric juice, 145
Chloroform, ... 154
Children, management of, . . 161
Chemistry, metallurgy, &c., . 166
Chloroform inhalations, . . 178
Corundum files, &c. . . 180
Chemistry for dentists, . . 232
Chemistry, organic and physiological, ... 254
Chloroform, death from, . 272, 275
Carious teeth, diseases from, . 278
Caustic, a new, . . . 289
Caries of the teeth, . . 308
Clasps, ... 310
Cell growth, ... 314
Capillaries of the liver, . . 321

PAGE.
Cartilage, dentine bone, structure of, ... 321
Chemistry, elements of, for, . 325
Chemistry, handbook of, . 329
Chemistry, principles of . . 331
Cholera, ... 333
Clerical gullibility, . . . 335
Chloroform, concerning, . 565
Caries and exfoliation of jaw, . 567
Cellulose in the human body, 662
Chemical lectures on consumption, 667
Circulation, theory of, . . 671
Commencement of the Baltimore College of Dental Surgeons, 675

D.

Dental medicine, memoirs of a few fundamental points, &c., . 105
Dental pulps, treatment of, &c., 122
Dentine, on inflammation of, 124
Dentists, slandering each other, 172
Dental Expositor, . . 179
Dental practice, on . 259
Dentistry, mechanical, . . 265
Development of the teeth, . 291
Dental medicine, . 294, 637
Dental patents, . . 302
Deposition of ivory, in the, &c., 307
Development of blood globules, 316
Dental pulp, treatment of, . 305
Dentistry, practice of, . . 312
Diamond, artificial, . . 334
Dwinelle, W. H., M. D., D. D. S., 346
Dental pulp, dissertation on, by Chapin A. Harris, . . 388
Dental tissue, essay on, by T. Russel, ... 405
Dentistry in France, . . 486
Dentistry at Kaw Mendi, West Africa, . . . 490
Dental education, . 501, 628
Dental Recorder, . . 503
Dental Surgeons, M. V. Ass'n of, 552
Dubs, C. H., . . 571
Dental science, . . . 647
Decay of teeth, periods of, . 655

E.

Extraction of wisdom tooth, tumor, 35
Etiquette, professional, . 51
Extraction of teeth, . . 124
Essay on the mortality of children, 243
Evans, T. W., D. D. S., 259, 448
Electricity, relations of, . 320
Exostosis. By Harvey, . 556

PAGE.
F.

Filling teeth when complicated with inflammation of the pulp, 20
Fracture of lower jaw, . 34
Filling teeth over exposed nerves, 124
Fusil oil, . . . 156
Freak of nature, . . 307
Fitzpatrick, Dr. A. . . 442
French, M. D., D. D. S., on, &c., 531
Flagg, Josiah Foster, biographical notice of, . . . 592
Freak of nature, . . 649
Fat in sugar, relations of, . 665
Flagg, J. F., . . 674

G.

Gastric secretions, . . 143
Gastric juice, . . . 145
Gastric juice, action of, . 147
Gastric juice, quantity of, . 148
Gold and silver, on parting, 227
Gold, crystallized, . 333, 653
Gold sponge, . . 346, 425
Georgia Blister and Critic, . 501
Glottis, movements of, . 662

H.

Hunter, W. M., European principle Americanized, . . 30
Harris, Chapin A., spontaneous inflammation of the dental pulp, 48
Harris, Chapin A., porcelain teeth mounted, &c., . . 55
Hill, A., on auroplastic principle, 223
Handy, W. R., M. D., . . 244
Hair lip, . . . 286
Histolysis . . . 315
Heart, function of, . . 318
Harris, C A., M. D., D. D. S., on dental pulp, . . 378, 516
Huxley, T. H., . . . 462
Hearing, restoration of, . 490
Heart, movements of, . . 498
Homœopathy, its tenets, &c., 499, 570
Homœopathy, fairly represented, 500
Harrison, J. D., . . 565
Harvey, Dr. S. H., . 566

I.

Inflammation of the pulp, . 20
Inflammation, spontaneous, of the alveolo-dental membrane, 48
Irregular teeth, . . . 93
Inflammation of dentine, . 124
Irregularity of the teeth, . 129
Intermittent odontalgia, . 132

PAGE.
Intestinal juice, . . . 153
Iowa Medical Journal, . 168
Ice, as a local anæsthetic, . 180
Inflammation of the lips and face, 623

J.

Johnson, Christopher, M. D., upon the teeth, &c., . 63, 238
Juice, gastric, . 145, 147, 148
Juice, pancreatic, . . 151
Juice, intestinal, . . 153
Journal of Science and Arts, 328, 669

K.

Keys, J. W., patents, &c., . 14
Koelliker, Dr. A., microscopic anatomy, &c., . . . 63

L.

Loss of teeth, &c., . . 164
Lost at sea, . . . 179
Lewis, John, D. D. S., mechanical dentistry, . . . 191
Levison, J. L., D. D. S., on tobacco, &c., . . 240, 248, 562
Lectures on surgical pathology, 323
Lecture on venereal diseases, 324
Lecture, introductory, Yale college, 330
Leslie, M., D. D. S., F. M. V. A. 352
Loomis, M., . . 573
Lusus naturæ, . . . 658
Lime, phosphate of, . 665

M.

Meeting of American Society of Dental Surgeons, . . 59
Microscopic anatomy on histology of man, . . . 63
Medicine, dental, . . 105
Microscopist the, or a complete manual on the use of the microscope, . . . 162
Maxillary bone, reproduction of, 171
Mechanical dentistry, . . 191
Mortality of children, . 243
Molar, lower, with four roots, . 333
Mustaches, . . . 334
Mechanical dentistry, by M. D. French, . . . 531
Maxillary bone, removal of, 652

N.

Nicotin, . . . 159
Nitrate of silver, . . 657
News Letter, . . . 672

PAGE.

O.

Odontalgia, intermittent, . 132
Odontalgic remedy, . . 134
Oil, fusel, . . . 156
Opthalmic surgery, treatise on, 165
Observations on the disease and loss of teeth, . . . 167
Our new volume, . . 168
Obituary, . . 504, 676
Ossification of the pulp, . 673

P.

Patents and patentees, . . 14
Principle Americanized, . 30
Physical condition of the teeth, &c., 38
Professional etiquette, . 51
Porcelain teeth mounted, &c., . 55
Plates, springing of, . 131
Plate teeth, . . . 131
Plates, swaging, . . 134
Preparation of mouth for full sets, 134
Pancreatic juice, . . 151
Poisons, organic, . . 156
Portrait of Professor White, 179
Piggot, A. S., M. D., on gold and silver, . . . 227
Palate, hard, destruction of, . 282
Practice of dentistry . 312
Platina pivot, . . . 307
Pain in the teeth and jaws, . 313
Phrenic nerve, . . . 318
Pneumogastric nerve, . 319
Periostitis, . . . 492
Periosteal irritation, case of, 493
Pancreatic fluid, . . 498
Patron to the dentists, . 504
Presence of mind, advantages of, 562
Pulse, influence of respiration, 660
Prize, . . . 670

R.

Risodontryphy, . . 134, 489
Reproduction in the maxillary bone, 171
Russell, W. S., D. D. S., M. D., 405
Rock, J. S., M. D., . . 628

S.

Silver and compounds, . 3
Scott, F. C., tumor cured, &c, 35
Spontaneous inflammation of the alveolo-dental membrane, . 48
Springing of plates, . 131
Swaging plate, . . . 134
Saliva, . . . 137
Secretions, gastric, . . 143

	Page.
Secretions, biliary,	149
Summary,	173
Sponge gold,	174, 346, 425, 650
Spotted child,	180
Salivary, on elective elimination of, &c.,	290
Supernumerary teeth,	313
Stokes, C., M. R. C. S.,	418
Spiritualism,	429
Sugar grape,	497
Short comings,	504
Shelby, Dr. W. A.,	567
Suction plates, improvement in,	571
Spiral springs, a new apparatus for,	574
Schmedicke, C. N. L.,	574
Soda water, poisonous effects of,	642
Soldering teeth,	655
Surgery, science and art of,	668

T.

Teeth, union of,	33
Tumor of two years standing, cured by extraction of wisdom teeth,	34
Teeth, physical condition of, &c.,	38
Teeth, porcelain, mounted, &c.	55
Truman, Edwin, on auroplastic principle,	79
Teeth, on irregular,	93
Talma, A. F., M. D., on dental medicine,	105
Treatment of exposed pulp,	122
Teeth, filling on exposed nerves,	124
Teeth, extraction of,	124
Teeth, irregularity of,	129
Teeth plate,	129
Teeth, caries of,	131
Teeth, on plate, to roots of natural teeth,	132
Teeth, in respect to character,	135
Tobacco,	157
Teeth, on the loss of, &c.,	164
Third Editor,	170
Tax on lawyers, dentists, &c.,	180
Tobacco, oil of,	240
Tooth drawing,	311
Thackston, W. W. H., M. D., D. D. S.,	362
Townsend, E., D. D. S., M. D.,	374
Teeth, cleansing the, by Thompson,	423
Thompson, T. D.	423
Teeth, regulation of,	448
Teeth, development of,	462
Teeth, treatment of,	488
Tomes, John, F. R. S.,	598
Tongue, black fur on the,	633
Tooth-ache,	659
Teeth, repair of,	664
Turkey and the Turks,	669
Townsend, resignation of,	674
Trouble in the wigwam,	676

U.

Union of teeth,	33

V.

Venereal diseases,	324
Vesico-vaginal fistula,	327
Valedictory, by Thackston,	362

W.

Wright, Prof. R. N., chemistry of metals, &c.,	3, 181, 337, 505

Y.

Yellow fever,	330